PRIMA'S OFFICIAL STRATEGY GUIDE

Red Baron II®

PRIMA'S SECRETS OF THE GAMES

SIERRA® Dynamix®

Includes Combat Maneuvers for All Aircraft

The Official Strategy Guide

Chris Jensen

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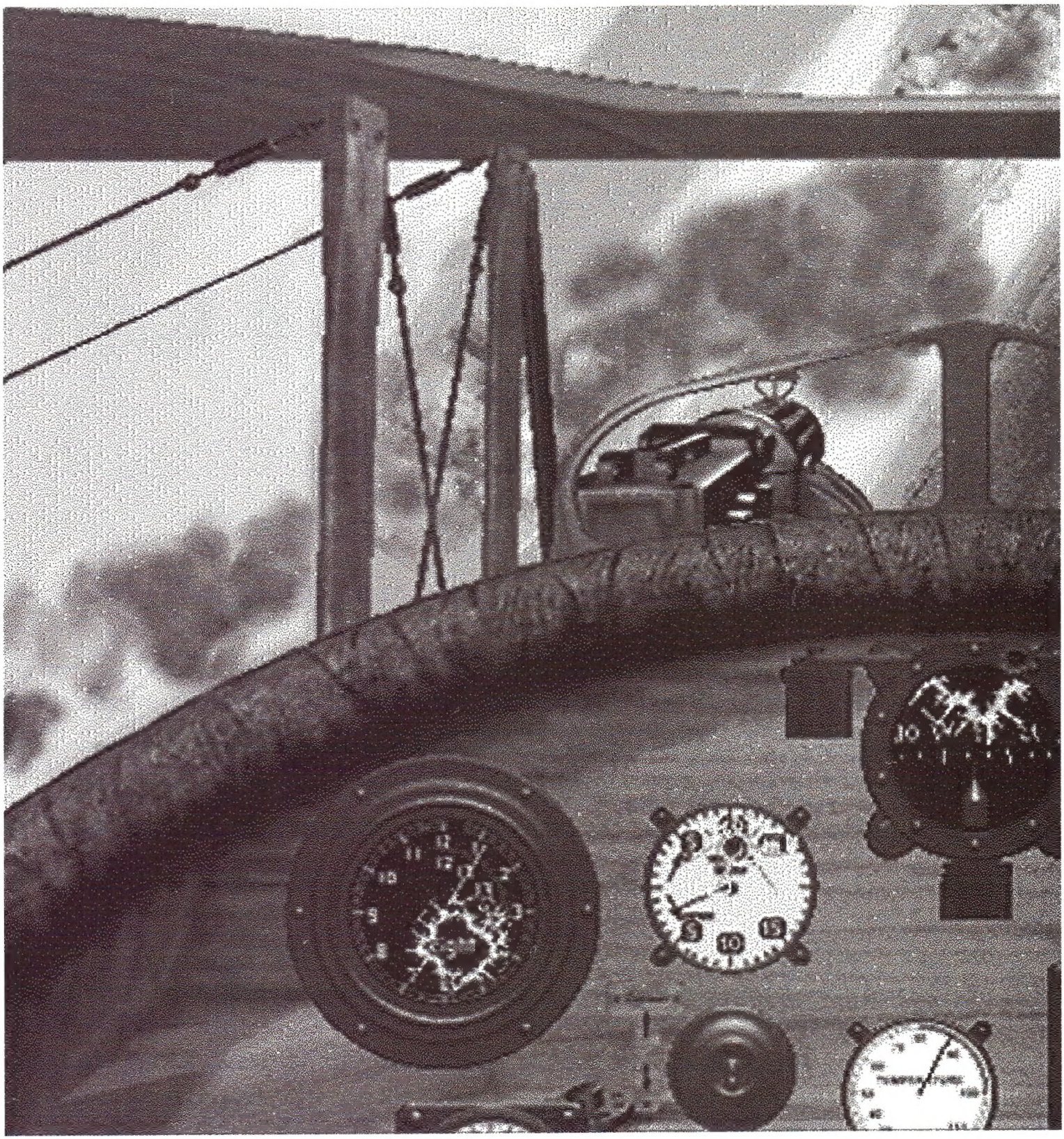
Red Baron II
™



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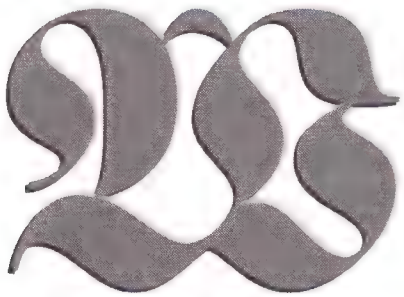
The Red Baron II Environment



elcome to *Red Baron II*. It's been worth the wait. Several years after the release of *Red Baron*, the fine folks over at Dynamix have brought their venerable World War I simulator up to date with current technology. The results are amazing. Finally, a simulation of this intriguing time in history has done the era justice.

Far more than a simple combat flight simulator, *Red Baron II* is an entire virtual war in a box. The entire world is alive at all times, with intense ground fire and historical battles that rage whether you're there or not.

Red Baron II boasts more than 39 authentic aircraft with 22 flyable planes, from such notables as the Morane Bullet and Fokker Eindecker to the improved Pfalz DXII and Sopwith Snipes. Dynamix's force-based, real-world-physics flight model faithfully simulates the performance envelopes of the actual planes.

User-definable difficulty levels allow players of varying abilities to take to the skies in a challenge customized to their own skills and tastes.

With over 40,000 square miles of accurately mapped terrain, players can fly over the real topography of the Western Front, complete with accurately placed cities, villages, aerodromes, bridges, trenches, and battle zones.

Bullets will riddle your plane, shattering wood and shredding canvas. The sky will scream with tracers, smoke, and explosions. As the Red Baron himself blasts out of the sun's glare, you realize this is more than just a game. This is a taste of history. Every move you make determines whether you become a legend in your own time, or simply another kill etched on the fuselage of the Baron's plane.

Many of today's gamers have been weaned on high-tech fighter jets equipped with radar, heat-seeking missiles, and the like. Ultimately, this leads to a certain degree of laziness. All the action takes place over stretches of miles. Your talents behind the stick become weak compared to those of the WWI flier. Aerial combat of that era was a matter of skill: With their adversaries just yards from them, the pilots of this time needed lightning-fast reflexes and cunning intuition.

And now you do, as well. Expect to be shot down often in your struggle for air supremacy. The skillful opposition will pose quite a challenge. But unlike the real pilots you have the luxury of starting over and trying again. They were not so lucky. They had to acquire their skills quickly or not at all. There was no choice.

And the pilots of World War I flew in machines that changed and evolved, on a daily basis, adding to the uncertainty. Aviation was such a new enterprise that no one, especially the pilots, could be sure what they'd be strapped into from one day to the next.

You must perform your every move with care and skill, no matter what plane you find yourself in. There's a lot to worry about once you're airborne. This chapter covers it all.

Fly Now

For players who wish to hop into the seat of a plane immediately and test their skills against some enemy pilots, the main menu's Fly Now option is just the ticket.

All the initial options for this quick mission can be altered using the Preferences/Fly Now button. You'll find the ability to fly any plane you choose, a great way to test each plane for every side in the air. Don't get too used to a particular plane, however, for when you begin the campaign in earnest, you'll be limited to the craft that corresponds to the date you enter the war.

Fly Now not only allows you to test the abilities and flight envelopes of each plane, but you'll also be able to select the type of opponent to go up against. Using the Fly Now option can greatly improve your dogfighting skills. For novice pilots, using the Fly Now option is imperative before engaging in a full-fledged campaign. Consider it your training ground, a place to hone your skills in preparation for the real thing.

This instant-mission structure not only pits you against the enemies of your choice but allows you to test your piloting skills in all kinds of weather, from clear skies to partly cloudy to a raging storm. And you can alter the

Figure 1-1
Fly Now Option Screen

season you fly in. Again, become accustomed to varying weather and seasonal effects in preparation for the real thing.

By toggling the Enemy AI Level, you'll learn how your current skills compare to the competition. Once you have a solid idea of where you fit in, you can adjust the campaign's difficulty levels to suit your skills. Don't go too easy on yourself. It's no fun winning the war if the enemies are as dumb as rocks.

Once you're regularly bringing down enemies, you'll be able to enter the hectic atmosphere of the campaign with confidence.

Graphic Settings

Depending on your machine's horsepower, you'll want to come to this screen and change a few settings to get the most out of *Red Baron II*. If the frame rate seems too slow, consider toggling off the Clouds option. It looks nice on the

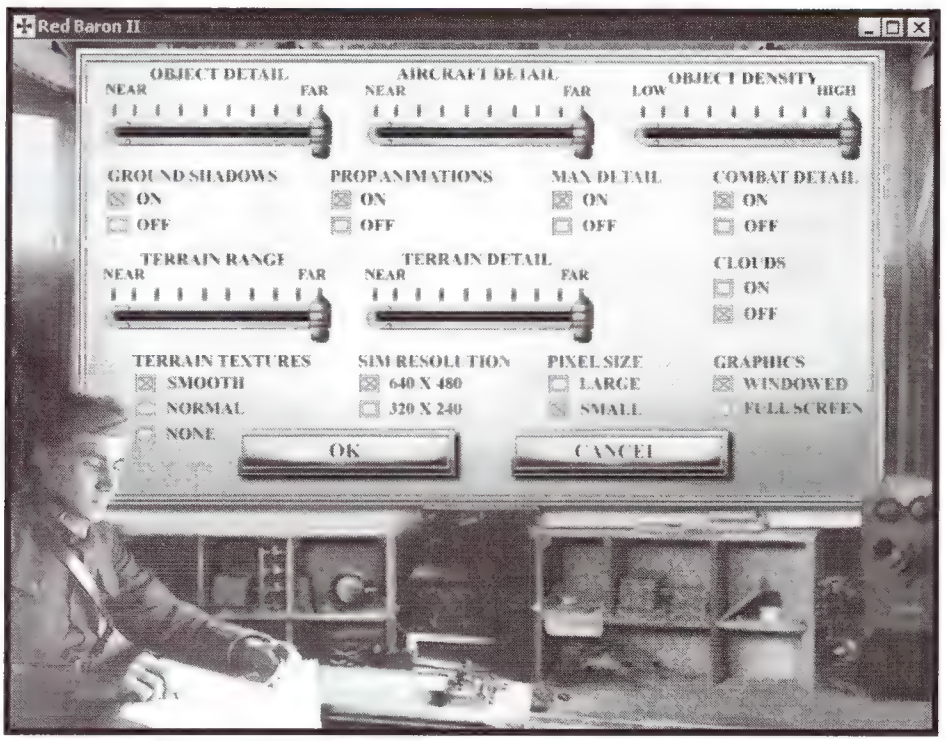


Figure 1-2

The Graphic Settings Screen

screen and adds to the ambiance, but it can slow down older CPUs. If you prefer to keep the clouds, you can lower the Terrain Range. This is especially useful when flying close to the ground, when a far horizon can really put a strain on the CPU.

You want a fast frame rate under any circumstance. Having your machine slow down when you're in the thick of battle can make for a mission that ends in a fiery explosion. Fiddle with the options until you find a pleasant middle ground of solid graphics and a smooth frame rate. You'll notice a great improvement in your future missions.

Realism Settings

Realism Settings offers a lot of options and it can be difficult to resist making the game too easy. Make every attempt to play the game at the hardest setting you can handle to immerse yourself in a real World War I environment.

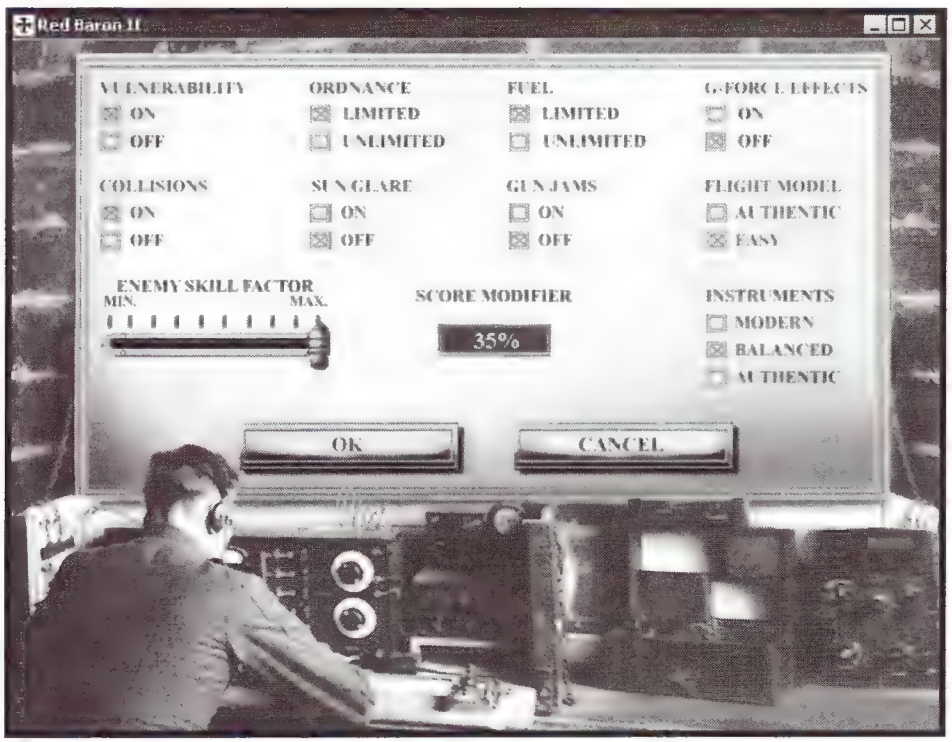


Figure 1-3
Realism Setting Screen

If you're new to aerial combat, however, especially behind the controls of sensitive vintage warplanes, you may want to come here and alter a few settings to match your abilities.

We've listed some of these options here, and explained how they affect the game.

Vulnerability

Perhaps the most difficult option to resist, toggling off Vulnerability will allow you fly unscathed over the skies of the Western Front. While this may seem like an appealing option, it really does degrade the authenticity of the simulation. This is recommended only for those pilots that want nothing more than an easy arcade experience or those that are having trouble progressing within the game. Toggling this option will also toggle mid-air collisions, so feel free to fly into enemy planes or even the ground. Vulnerability has a severe effect on the Score Modifier and should not be used unless absolutely necessary.

Ordnance

This option affects the availability of rockets, bombs, and ammo for your plane's machine gun. Let's face it, there are two types of pilots out there—the one who can monitor the ammo and fire only when a hit seems likely, and the one who loves to ride the trigger, squeezing off rounds with abandon. Toggling your ordnance to "Unlimited" will apply a –25 percent modifier to your scoring. This is an excellent option to choose if your dogfighting skills leave a little to be desired. As you improve, come back and limit your ordnance availability.

Fuel

It has little effect in the long run, but this option gives you one less thing to worry about. Fuel concerns within *Red Baron II* are kept to a minimum except for the rare, extremely long flight. You most likely won't notice a difference within the simulation, so consider leaving your fuel at "Limited." Toggling it off subtracts nine percent from your score modifier.

G-Force Effects

Tired of having the wings ripped from your plane during a dogfight? Simply toggle G-Force Effects to the off position and you won't have to worry about it. This is a great option for novice pilots who are unfamiliar with fragile vintage aircraft. Of course, the real solution to your problem is gaining experience with each craft and studying the flight dynamics of each. If you don't feel like going through the learning process and simply want to fly your plane to the limit at all times, turn off G-Force. Selecting this option subtracts 31 percent from your score modifier.

Collisions

Dogfighting involves flying perilously close to the opposition. Because of this, collisions can (and most likely will) happen from time to time. Turning this option off affords you the luxury of not having to worry about plowing into enemy, or even friendly, craft. Even flying in formation with your wingmen is dangerous. Once you've mastered the piloting of your craft, turn

Collisions back on just to add a nice degree of realism. Toggling Collisions off subtracts 26 percent from your score modifier.

Sun Glare

This is a minor option that's mostly aesthetic. Enemy pilots will use the tactic of luring you toward the sun to put some glare in your face, giving them an opportunity to sneak away and get on your tail. To circumvent this tactic, you can turn off Sun Glare for a minor four percent Score Modifier deduction.

Flight Model

One of the bigger impacts on the game is the Flight Model. If it's set to "Authentic," expect each and every plane to fly and behave like its real-life counterpart. An Authentic flight model will find you struggling for altitude and sometimes spiraling into a nasty spin. This is as real as it gets, and all pilots, no matter what their skill, should consider flying at this level. If, however, these vintage planes are getting the best of you, you may want to ease into the simulation by setting this to Easy. Doing so, however, costs you a score modifier to the tune of a whopping 50 percent.

Enemy Skill Factor

Each notch on this slider is worth plus or minus 5 percent, depending on the level. If set to "Maximum," expect the enemy to perform at their very best, giving you a real challenge in the air. Unless you're a hotshot, consider toning down this setting to something more comfortable. Find the right balance for your skill level, but not so low that you remain unchallenged.

Instruments

"Authentic" instruments reflect the real dials and gauges of vintage aircraft. Unless you're having difficulty understanding what's what, leave this setting on Authentic. "Balanced" offers a mixture of easy-to-read dials and authentic gauges and is a minor 6 percent hit to your score modifier. If, however, you've been weaned on jet fighter simulations and crave a modern look, by all means set this option to "Modern" and take the nine percent subtraction.

Creating a New Campaign Pilot

Here's where your career as a World War I fighter pilot begins in earnest. Everyone has their own preference for the side and date at which they'd like to enter the war. For the sake of realism you should begin in early 1916 and follow the course of the war as it develops. If you choose the German side, expect a sizable advantage at the beginning of the war, plus the assistance of more experienced pilots to watch your tail. You can't play the Americans until 1918, when they officially entered the war.

No matter which side you select, you must select a squadron to join. Your choice will determine your starting location and aircraft. The last thing you'll have to resist is altering your starting rank. You should earn your rank as the real pilots did. With rank comes responsibility, so take it slow when you start. Learn from your leader so that when the time comes to command your own squadron, you'll be prepared.

Squadron Ops

Kill Board

The Kill Board depicts how many kills each pilot within your squadron has made. When your rank is low, this information doesn't have much use, but when the day comes to command your own squadron, it will play a vital role. You'll be able to determine easily which pilots are really strutting their stuff, information you can use to jockey pilots around from one mission to the next. For instance, if there's a ground target that must be dealt with, the wise commander will put an experienced and talented flight crew together to do so. Placing inexperienced pilots in critical missions is the gateway to failure, usually resulting in not only a failed mission, but the needless loss of life and equipment.

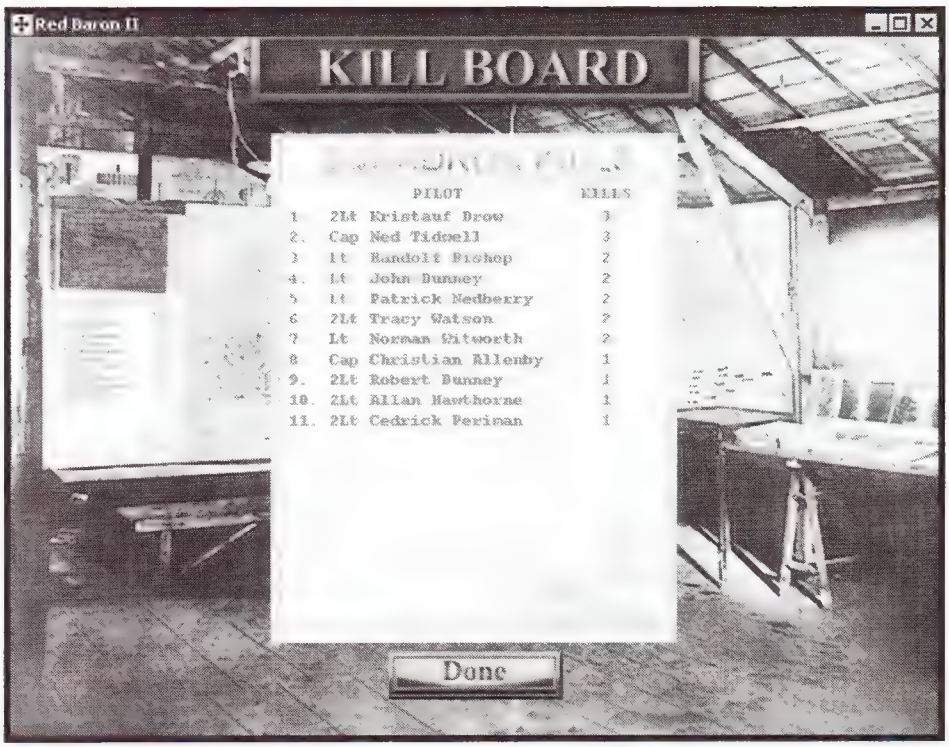

Red Baron II
KILL BOARD
PILOT KILLS
1. 2Lt Kristauf Drow 3
2. Cap Ned Tidwell 3
3. Lt Randolf Bishop 2
4. Lt John Dunney 2
5. Lt Patrick Nedberry 2
6. 2Lt Tracy Watson 2
7. Lt Norman Witworth 2
8. Cap Christian Allenby 1
9. 2Lt Robert Dunney 1
10. 2Lt Allan Hawthorne 1
11. 2Lt Cedrick Perman 1
Done

Figure 1-4

The Kill Board serves as a constant reminder of who's hot... and who's not.

Pilot Dossiers

This is where you can learn about the members of your squadron. Every name you see is based on a real-life pilot of the time. You're flying with real people who wield real skills. Here, you can keep tabs on how each have fared in their various missions, and even what medals they've earned. The more you know about your squadron, especially the subtle details of their success, the more effective a commander you'll be. Knowledge truly is power.

Squadron Info

The Squadron Info screen is a great place to look for pertinent information about your current squadron. For instance, you can easily learn your current aerodrome of operation, region where the aerodrome is located, overall quality of the squadron based on historical performance, and how many, if any, Aces you currently have within your ranks. This screen also displays what plane

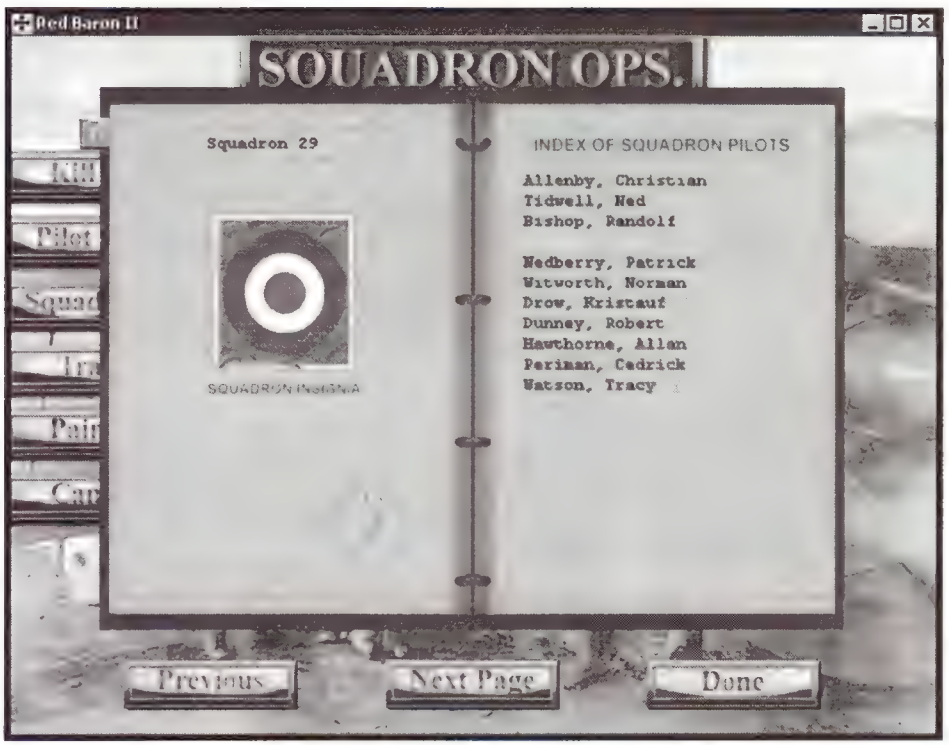


Figure 1-5

To keep tabs on members of your current squadron, check out the Pilot Dossiers.

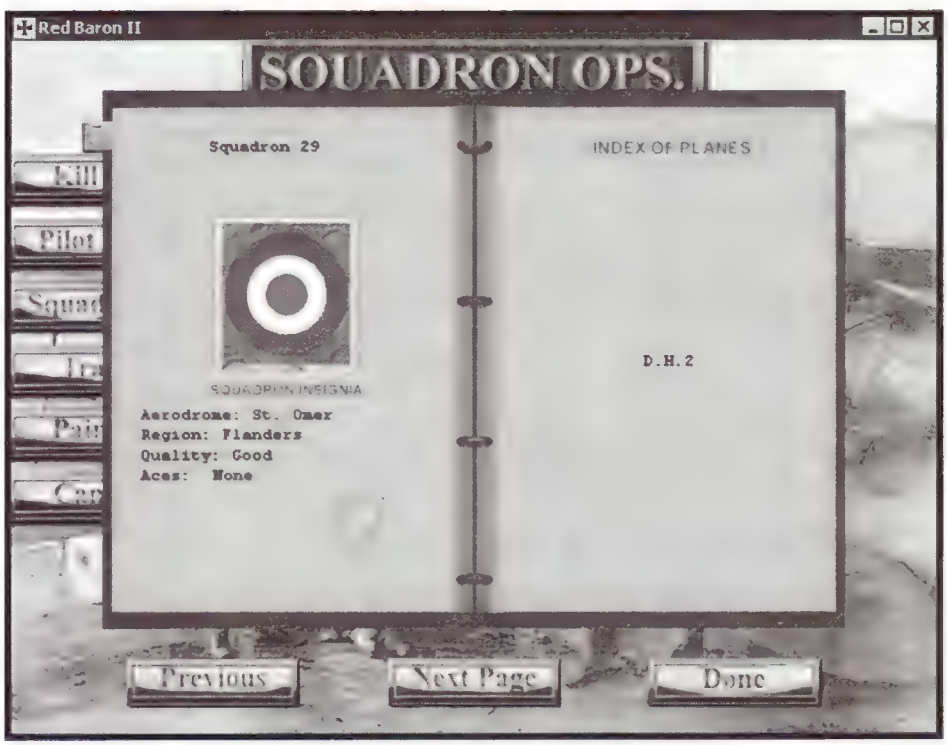


Figure 1-6

Squadron Info will give you information about your current complement of planes.

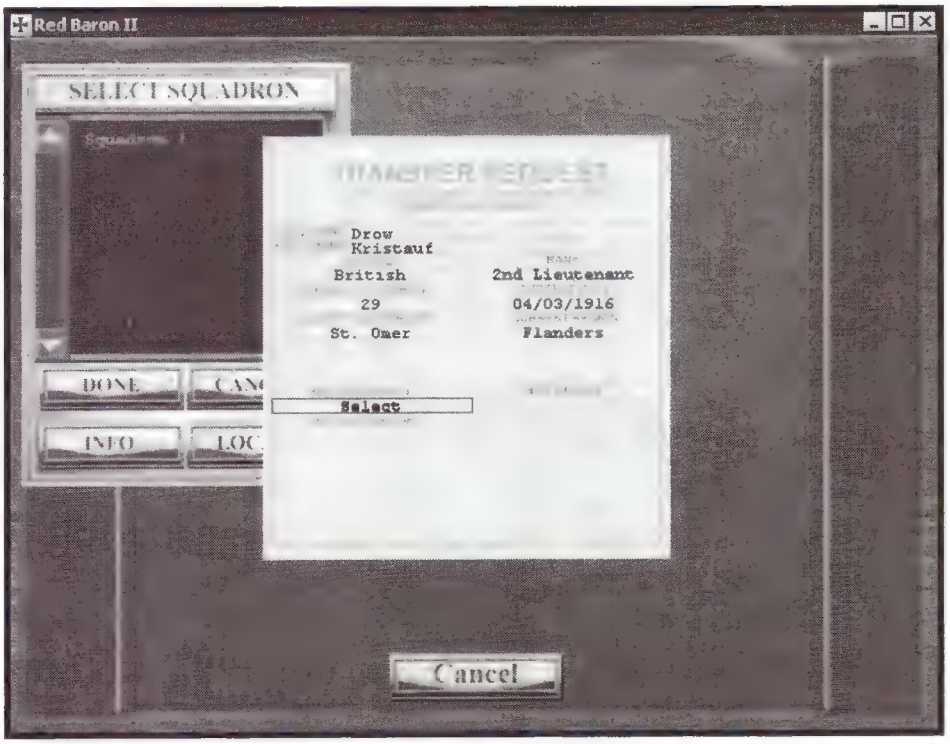


Figure 1-7

Place a request for transfer to move from one squadron to another.

types you currently have access to, including a full schematic of each. As the war progresses, you'll want to return here and learn the latest information, especially details on available planes.

Transfer

There will be times when you simply want to move to a different squadron. If you feel so inclined, this is the screen to come to. When you select a new squadron, a list of current, active squadrons that you may ship out to will display. Whether you'd love to fly with a particular historical pilot as a wingman or simply want to fly over new territory, feel free to move around and follow the heat the of battle as it wages through the campaign game.

Your record needs to be good in order to qualify for a transfer to a better squadron.

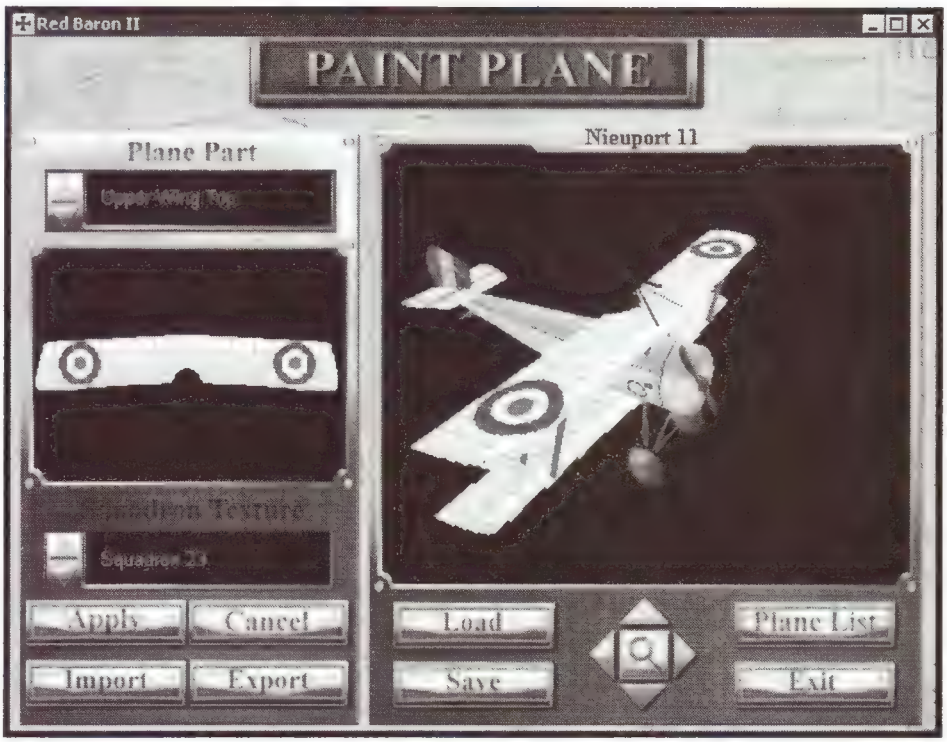


Figure 1-8

The Paint Shop allows you to customize the look of your plane.

Paint Shop

Once you've climbed to a high enough rank and command your own squadron or have achieved Acehood, you'll most likely want to come to the paint shop and redo the look of your squadron craft. This lets you personalize your aircraft and, if done properly, can make a big difference in the heat of battle. Keep in mind that, during a battle, you need to be able to distinguish friend from enemy easily. For this reason, you should make your plane stand out, using bright, vibrant colors, easy to spot from a great distance. If you opt for bland colors that are hard to differentiate, you may waste valuable time in the heat of battle trying to figure out who is who.

Sure, your plane may not be the prettiest thing in the air, but loud colors will make all the difference, giving you one less thing to worry about. Be sure to save your paint job when you're happy with the look.

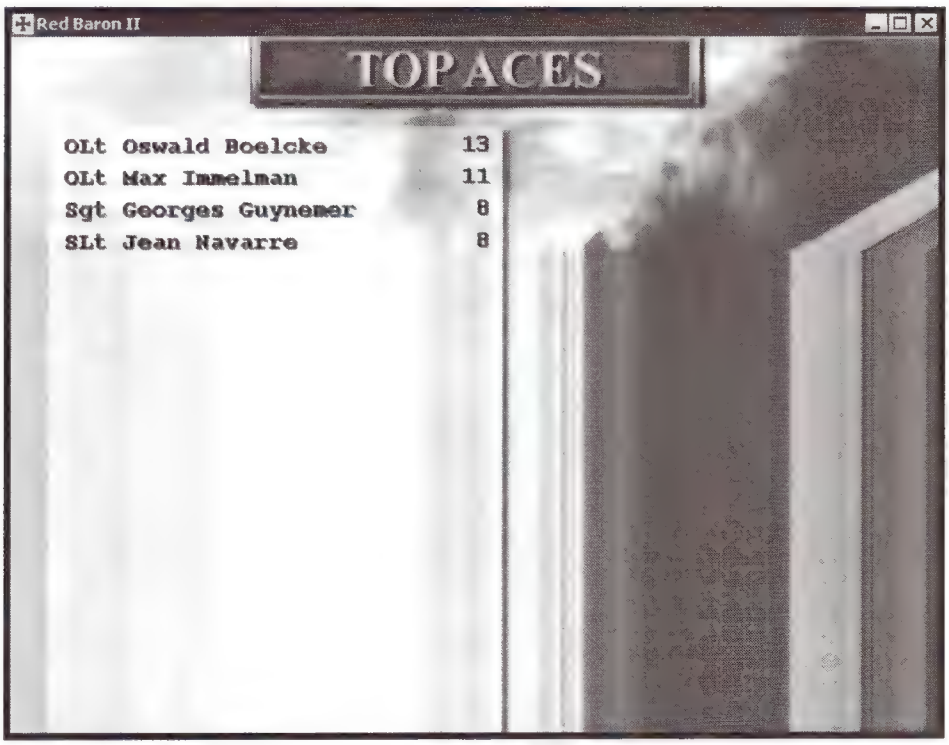


Figure 1-9

The Top Aces screen lets you know who has five or more kills.

Intelligence

Top Aces

Want to know who poses a threat? Head over to the Top Aces screen to learn who's racking up the kills. If you're beginning the game in the early stages of the war, don't be shocked to find a preponderance of German names hogging the list. The Germans were considerably more experienced in the early going.

This screen tells you the name and number of kills of each pilot, as well as his current rank. You may not think this screen is very important, but it does tell you plainly who to avoid until you have more experience under your belt.

Figure 1-10

The Ace Dossier gives you the lowdown on each Ace pilot currently flying.

Ace Dossier

So, you know who the Aces are but you don't know what they've done. For more information, this is the place to come. You can break down the Ace list by country and then check out the details of each pilot.

For instance, if it is April 1916 and you click on Oswald Boelcke, you'll discover a breakdown of his current 13 kills, listed by date and type of aircraft shot down. More importantly, you'll learn where his most recent base of operation is. In the case of Boelcke, you can see he's currently stationed at Seranvillers Aerodrome in the Flanders region. If you happen to be stationed in the Flanders region, don't be surprised if you come up against Hauptmann Boelcke in the skies.

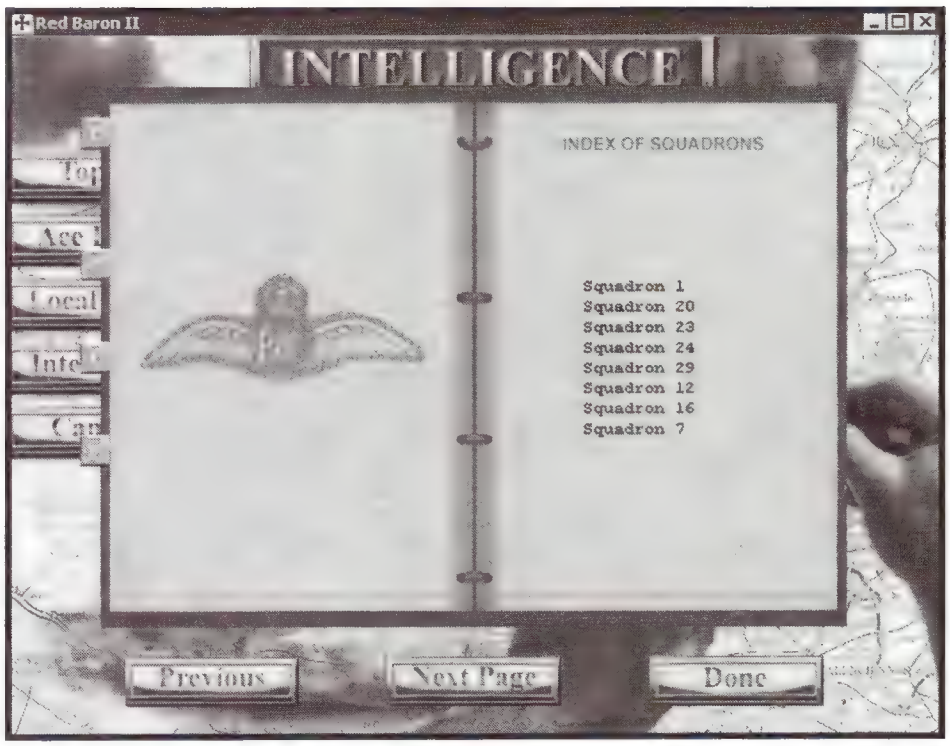


Figure 1-11

Local Squads gives you the lowdown on every current squadron.

Local Squads

Once you've learned about your current squad, it's time to bone up on all the other active squadrons. Here, you can learn where every squadron for every country is currently posted, as well as their current stock of aircraft. Perusing this information will give you a complete understanding of where everyone is located in relation to the map. In the game's early stages this information will be important only to the squadron commander, but after you're promoted to control of your own squad, you'll want to venture here and learn as much as possible.

The information in Local Squads can help you plan future missions, perhaps steering clear of certain regions until you feel ready to tackle them. The commander who doesn't come here to learn the whereabouts of competing squadrons shouldn't be surprised when they stumble on a hungry Oswald Boelcke during a routine reconnaissance mission.

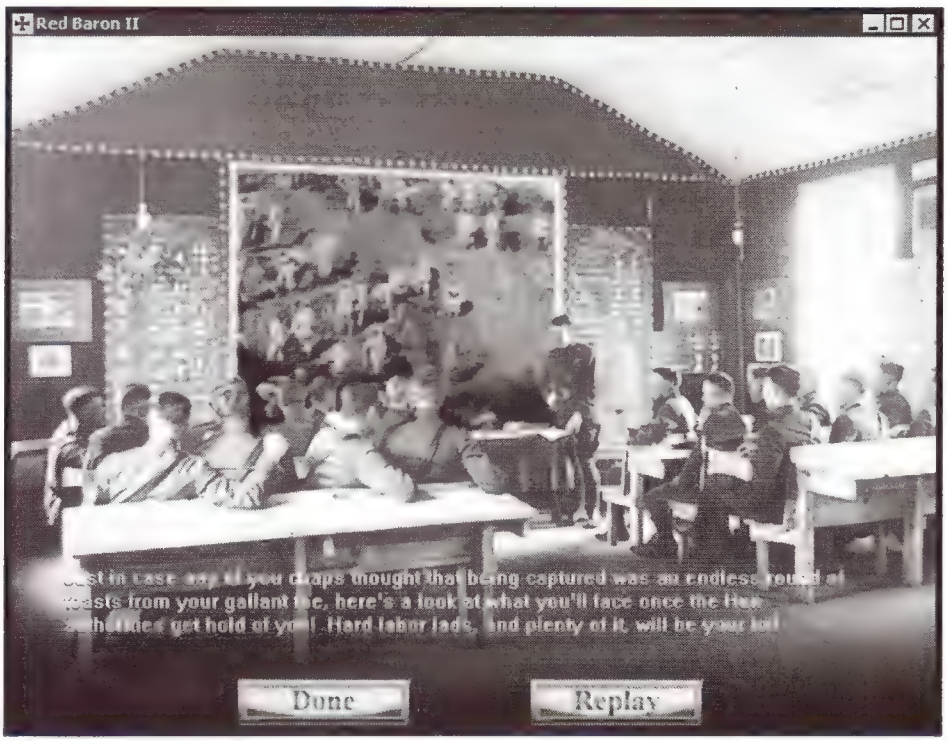


Figure 1-12

Intelligence Report Screen

Intelligence Reports

While not pertinent to the game, this screen does help flesh out your understanding of the current course of the war. As the war develops, return to this screen to gain useful information about the enemy. You may learn about a new artillery gun or tank that's ripping up the countryside. This screen also can assist you in identifying enemy equipment, something you'll find very useful in the heat of battle. Just remember, the knowledge you have when embarking on a mission can mean the difference between success and failure.

Personal Stats

As you progress through the war you'll accrue your share of kills. To see a complete breakdown of stats for your current pilot, come to this screen. You'll

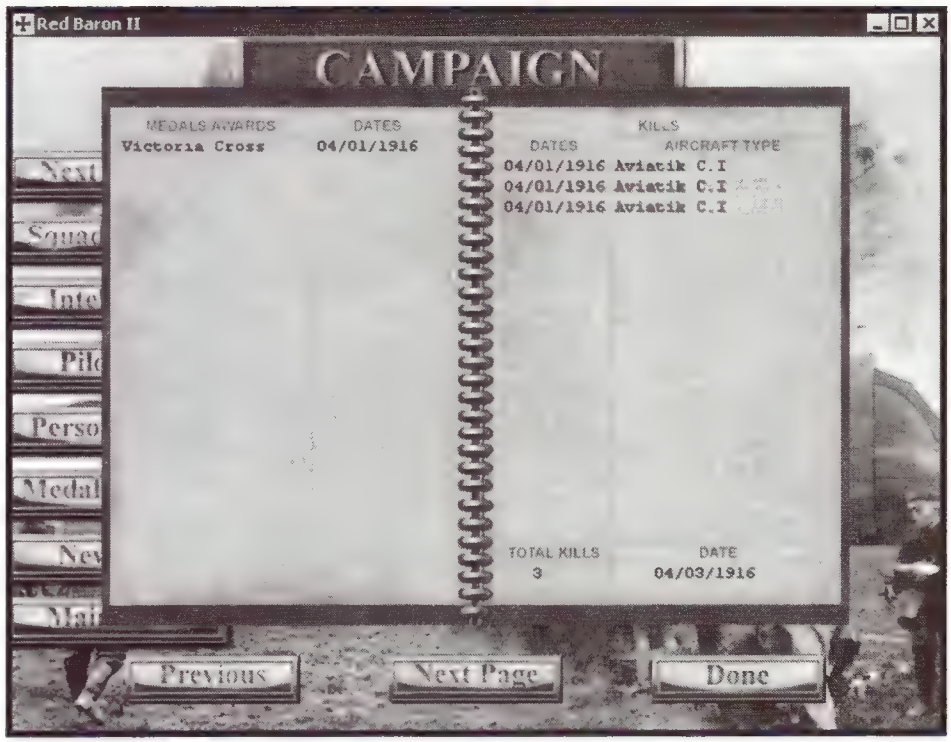


Figure 1-13

Personal Stats shows you how well you're flying.

see the medals and awards you currently possess, including the date they were issued, and you'll get a complete breakdown of your current Kill Board.

In the case of this pilot, we can see he has three confirmed kills, each by bringing down a Aviatik C.I aircraft, all on a single day of operation—April 1, 1916. We can also see that, after this apparently successful mission, this pilot received the coveted Victoria Cross. A great day of flying, to be sure.

Awards/Medals

You've worked hard to earn those medals and awards, so take a little time to admire them. While not pertinent to the game, these most truly reflect your success in the air.

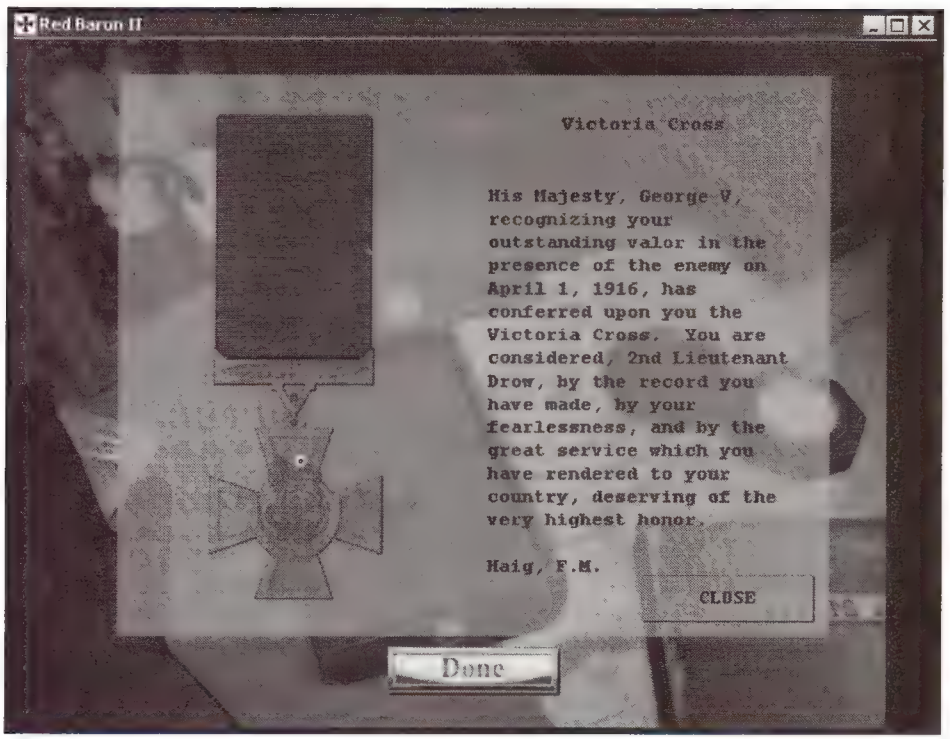

Red Baron II
Victoria Cross
His Majesty, George V, recognizing your outstanding valor in the presence of the enemy on April 1, 1916, has conferred upon you the Victoria Cross. You are considered, 2nd Lieutenant Drow, by the record you have made, by your fearlessness, and by the great service which you have rendered to your country, deserving of the very highest honor.
Haig, F.M.
CLOSE
Done

Figure 1-14

Awards and Medals for Your Current Pilot

2

War Management

Welcome to War

You've chosen a side in the coming conflict, created a new pilot with which to wage war, selected a squadron in which you hope to strut your stuff, and now you're ready to engage in full-fledged combat with a real opponent.

Most contemporary flight simulators have a "Linear Campaign" structure. This means no matter how you fare in the mission at hand, the next mission will always be the same. Ultimately, you're left playing the same mission over and over until you can proceed to the next. Not so with *Red Baron II*. Instead, you have a Dynamic Campaign structure, wherein the actions, successes, and failures in one mission may carry over to the next. For instance, if your mission is to knock out some enemy artillery guns and you destroy only two or three, your next mission may find that remaining artillery haunting the objectives of your follow-up mission.

The key to success in *Red Baron II* is to perform above and beyond the call of duty. While your mission objectives are by the far the most important, they're not the end-all to success. Your commander may issue the order to venture out and patrol for enemy planes, but that doesn't mean you shouldn't take out any enemy armor that may be penetrating the lines near your theater of operations. Anything you can do to inflict damage on the enemy is important; every enemy you kill will be one less concern the next time you venture out on a mission.

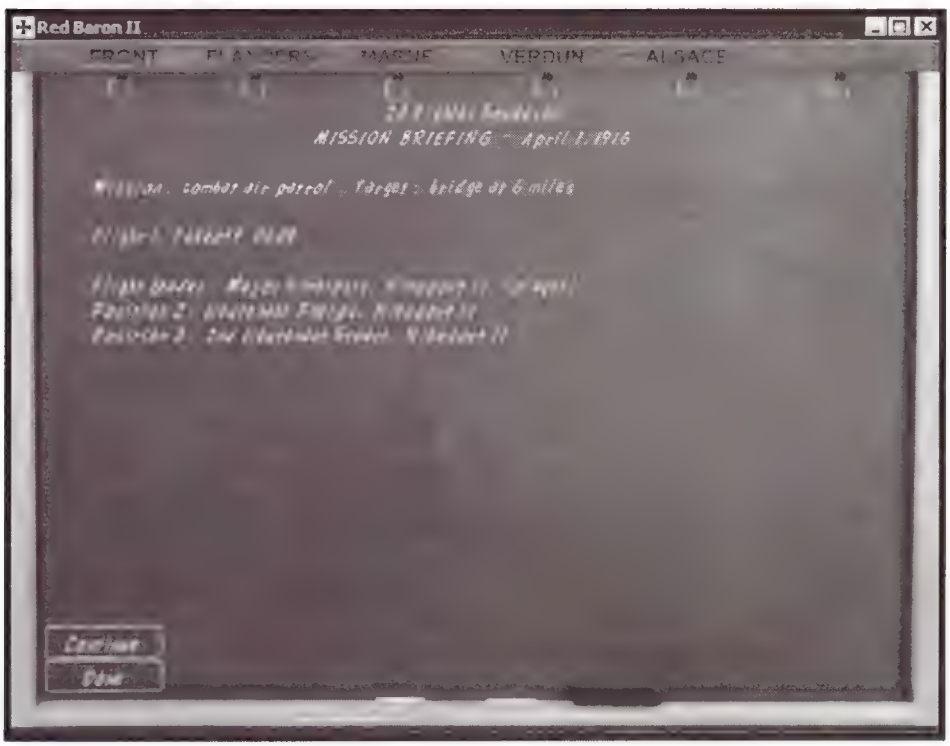
Greed Kills

Greed is a dangerous thing. Often, a pilot will attempt to do too much and pay the ultimate price. The more you risk to inflict damage on the enemy, the more chances there are you'll get shot down. Concern yourself first with the mission objectives, then with a few secondary objectives, and finally with getting your plane back in one piece. It's the foolish pilot who tries to take out everything in sight.

Although keeping the primary objectives of your mission in mind is critical, you don't want to stray too far off course to hunt for a few secondary

targets. Try to fly within a narrow zone of each waypoint and take out targets that don't require you to stray off course. Often, an enemy pilot will try to lure you to a place on the map where he or she knows a battery of artillery is waiting to pound you. Don't give in. Make the enemies come to you. To follow is to fall into their traps.

The Mission Briefing



Here's a breakdown of the Mission Briefing screen. You can see the name of your squadron at the top (in this case, 23 Fighter Squadron). Below that is the date of this mission (in this case, April 1, 1916, the widely accepted beginning of aerial combat in World War I).

Next to "Mission" you're told the type of mission expected of you. In this case, you must fly a Combat Air Patrol, a fancy way of saying you're on the hunt for enemy fighters. Beside that, "Target" is followed by "Bridge at 6 miles." This doesn't mean you're supposed to take out a bridge. Rather, the

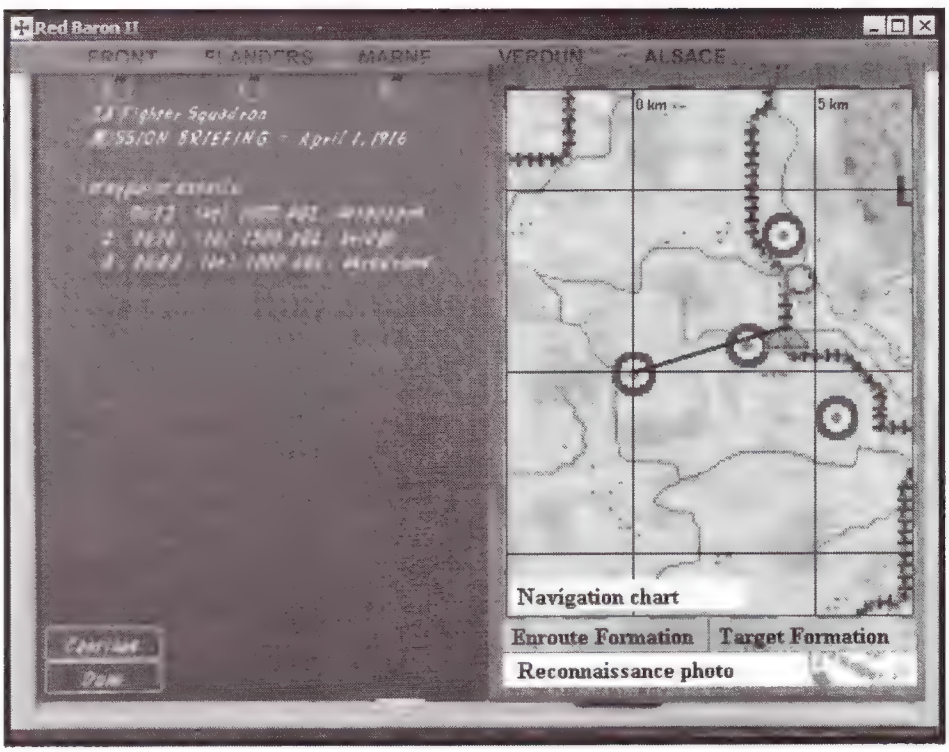
bridge acts as a landmark for navigational references, basically telling you you'll be flying in patrol around a bridge located about six miles from your current aerodrome.

Next, you learn the name of your patrol—Flight 1—and the takeoff time for the mission.

Last, you can view the names of pilots making up this mission—in this case, Maj. Simbiosis in a Nieuport 11, and Phelps and Stuart, each in a Nieuport 11.

Press Continue to learn more about this particular mission.

Navigation Chart



Now you really must absorb the information you see. Understanding this screen is vital; it allows you to visualize the mission you're about to embark on.

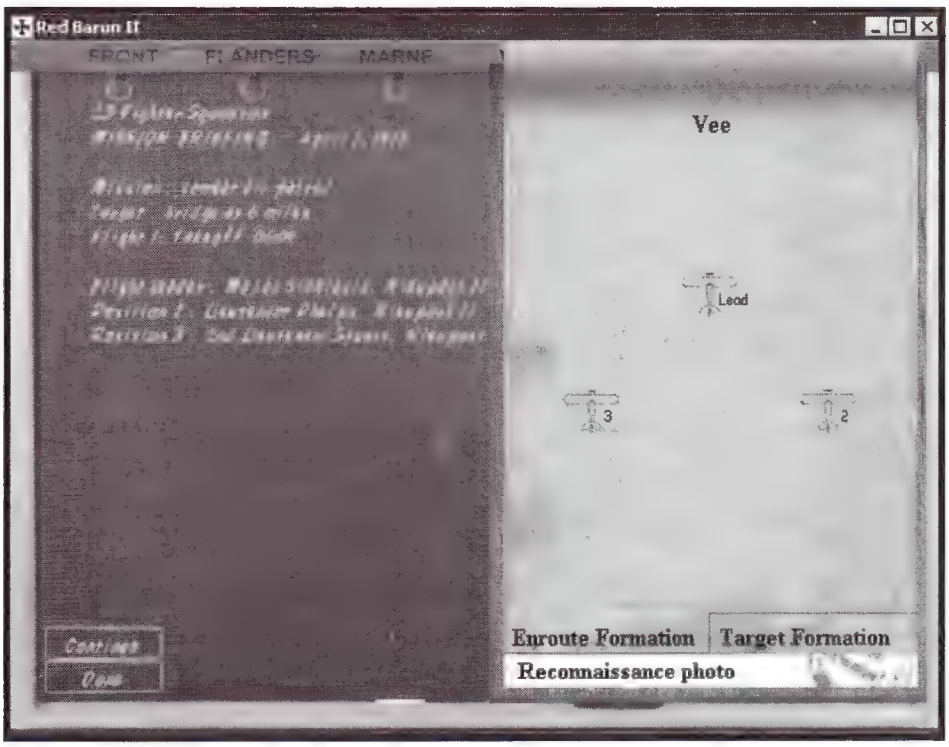
On the right side of the screen, a map indicates your starting position and where you should wind up for the mission objective. Thinking back to the briefing, remember you're supposed to engage in a Combat Air Patrol six miles away around a bridge. Knowing this, you can surmise you're taking off from the aerodrome indicated at the left side of the map and flying due west toward the bridge over the train tracks. The nearby train tracks give you one more thing to look for when you're finally in the air. As long as you can see the indicated tracks, you'll know you're in the right area.

In addition to helping you navigate, this screen can alert you to other targets of opportunity. In this case, it appears you're patrolling behind your own front line, so an enemy train scooting down the tracks is unlikely. However, if this mission were taking place over enemy lines, you'd know to keep your eye out for a potential enemy train. Knocking out cargo-carrying trains will benefit your war efforts greatly.

Right of the map you can glean further helpful information about this mission. For example, at Waypoint 1 you should be flying at an altitude of 1,000 feet; a landmark to watch for is an aerodrome—in this case, the circle next to the bridge icon. Waypoint 2 should find you flying at an altitude of 1,500 feet and well over the bridge looking for enemy planes. Once your Combat Air Patrol is over, you'll descend 500 feet on your way home, again using the aerodrome as a landmark.

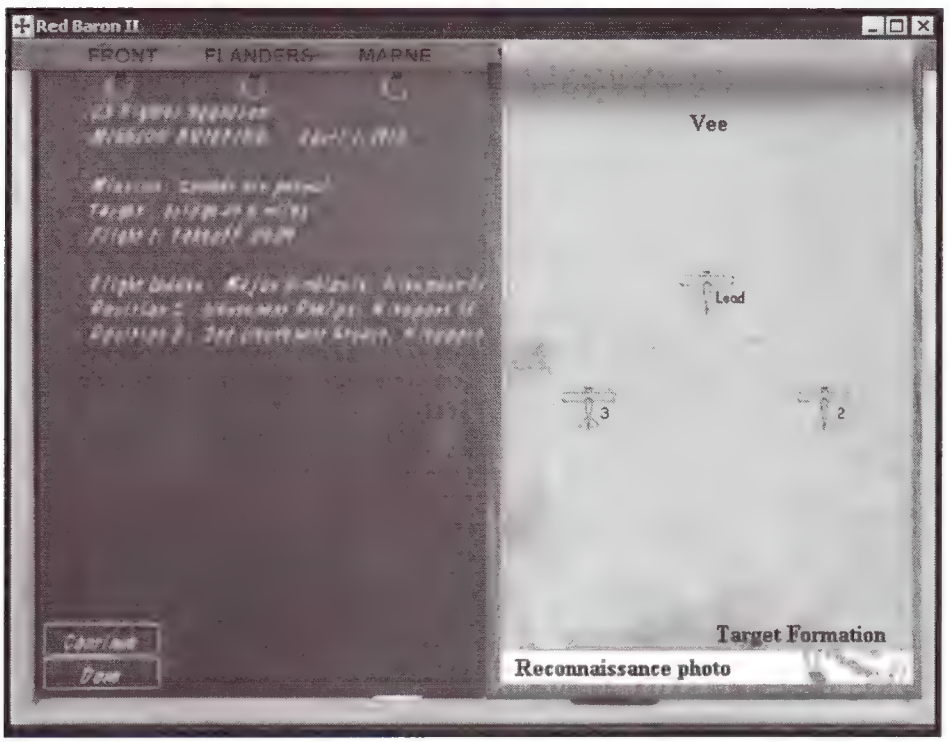
We can't overstress the importance of landmarks. Pilots of the time took great pains to familiarize themselves with the countryside. The same is expected of you. It's easy to get lost out there without traditional navigation equipment, so you must use landmarks to keep flying in the right direction.

En Route Formation



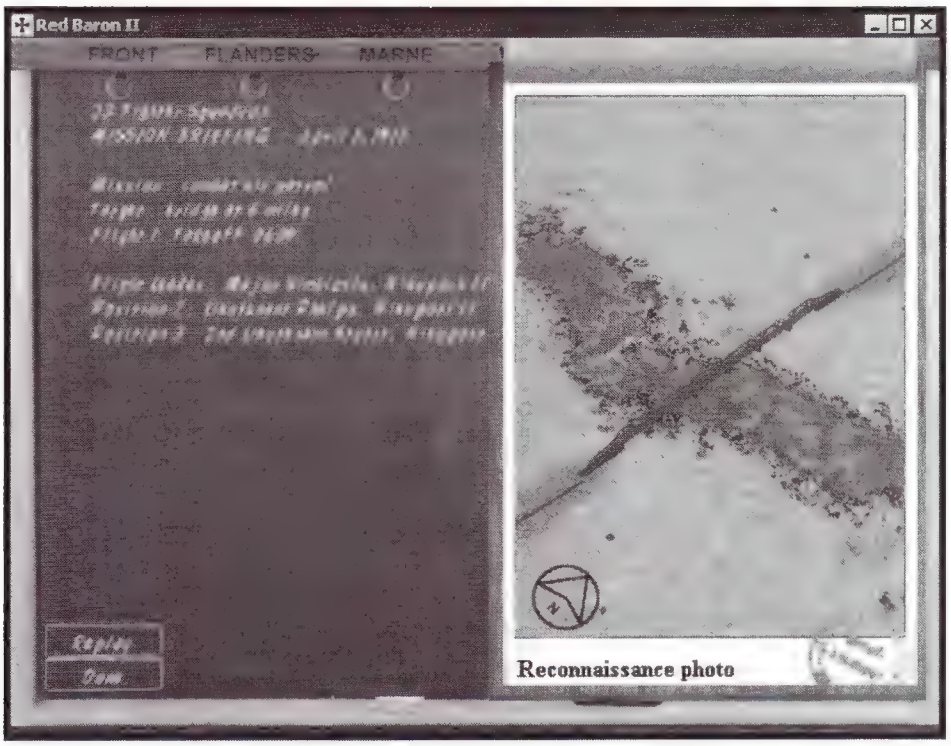
This display shows you the intended en route formation—that is, the formation you're expected to fly in as you move toward your primary objective. Flying in formation is important to success. Your wingman will always try to stay in formation, no matter what you may be up to. Flying wildly is a sure way to break up the pattern, forcing your wingmen to concern themselves more with finding you when they should be guarding you.

Target Formation



This display indicates the formation to assume on reaching the target waypoint. In the case of this mission, you're expected to fly in a Vee formation during the course of your Combat Air Patrol.

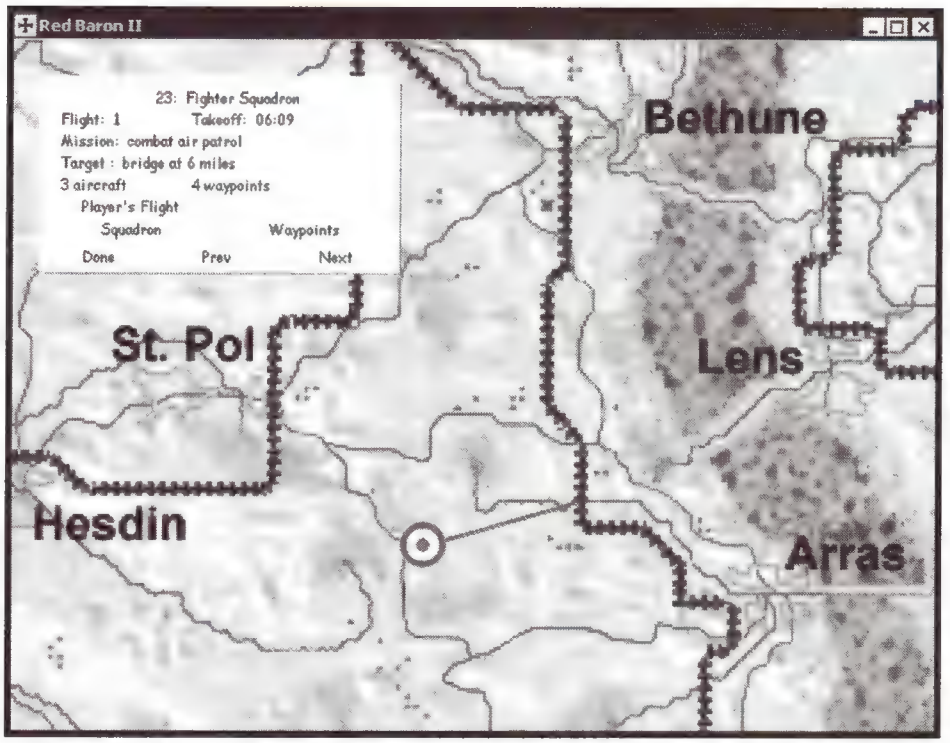
Reconnaissance Photo



One of the most important tidbits of intelligence you can have is a good reconnaissance photo. This display shows you a photograph of the target or target landmark you seek. In the case of this mission, you know you're flying Combat Air Patrol over a bridge six miles away. This photo shows you exactly what that bridge looks like. When you're in the air and see that bridge, you'll know to begin scouting for enemy aircraft. If you don't see the bridge, you immediately know you've strayed off course.

When you hit the Done button, you'll view a new screen allowing you either to jump right into the mission or to view a more detailed flight plan. The wise commander and pilot will view the more detailed plan, so let's take a moment to see what it has to offer.

Detailed Map



To better understand the information displayed here, you must use the small windowed area in the display's upper right. The initial information here indicates stuff you already know, such as squadron name, takeoff time, mission type, and target landmarks. If you press the Waypoint button, you'll see the screen in figure 2-1.

Now you have a nice breakdown of your flight. As you click on each of the four available waypoints, a flashing white triangle appears on the map display indicating where that waypoint is located. In the case of this display, we've selected Waypoint 3, represented by the triangle over the railroad tracks, which you know is near a bridge. You can also use waypoint details to remind you of your time schedule. You need to perform the mission within the indicated times; this increases your overall effectiveness within the war. Every second you waste is another opportunity for the enemy to strengthen its defenses.

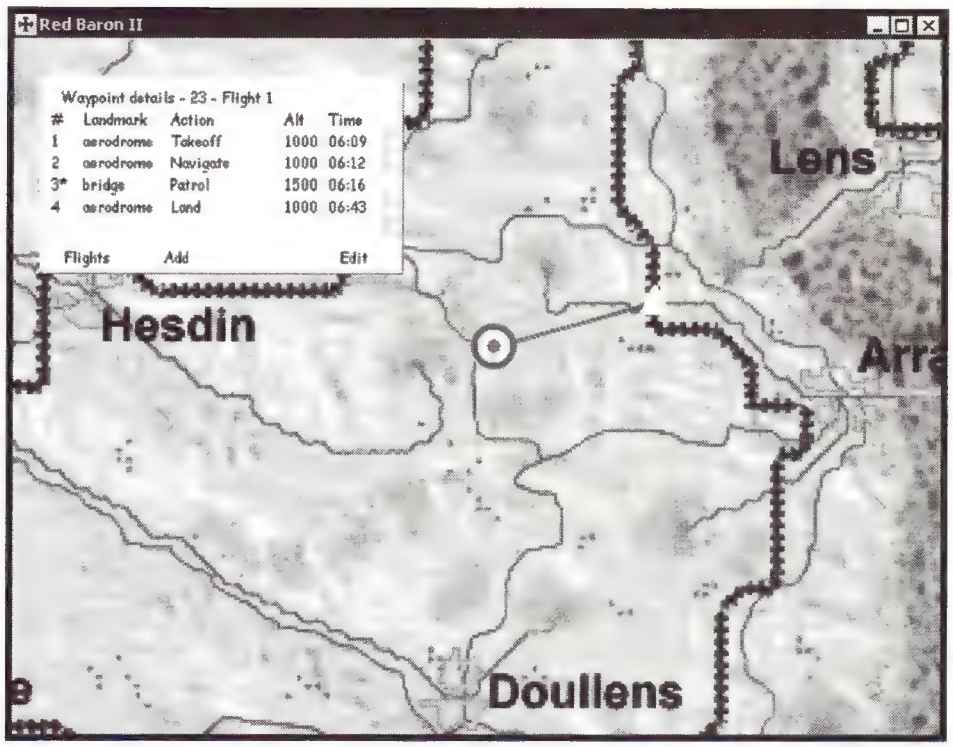


Figure 2-1
Waypoint Details

This screen allows you to alter the waypoints if you're currently commanding the squadron. To try a different approach to the target, simply clicking the Edit button will allow you to move the various waypoints. At the war's early stages, this can prove hazardous; you can't be entirely confident about where the enemy has stationed their equipment. Therefore, we recommend you stick with the offered flight plans until you have better intelligence.

Pressing the Flights button on the window takes you to the screen in figure 2-2.

Here you can see what the other flights in your squadron have planned. Yours isn't the only group of pilots taking to the air today. You know you're Flight 1, and you'll take off first, which explains why you're about to engage in a Combat Air Patrol. Once you sweep the skies clean of fighters, the other three flights will take off and hopefully have an easy time with their objectives. But keep in mind—and this is very important—that their success hinges on how well you perform your mission.

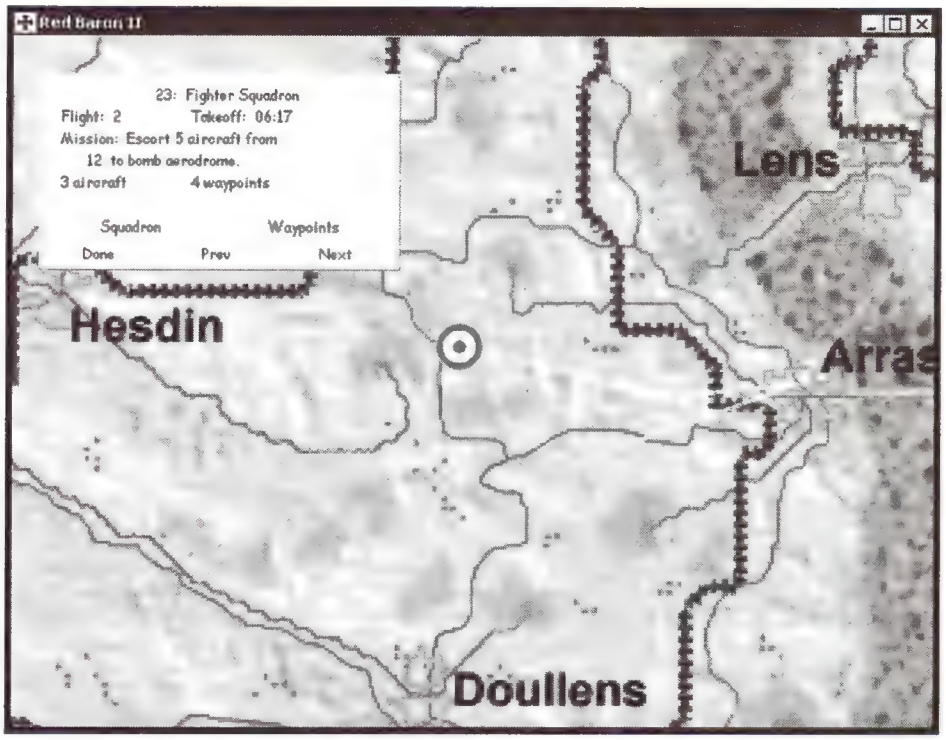
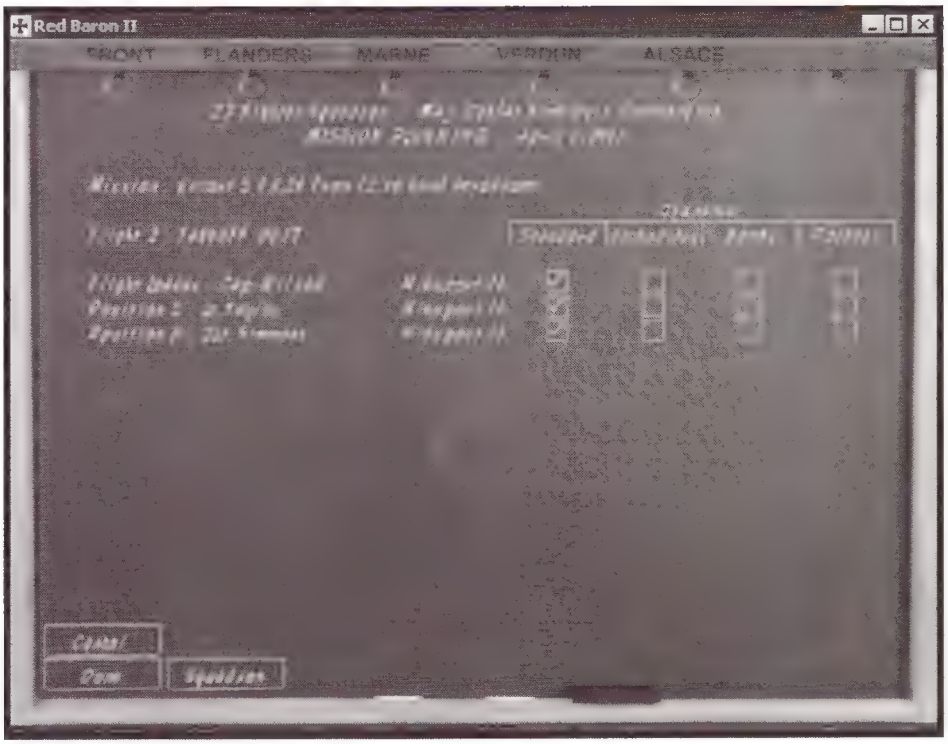


Figure 2-2
Flight Information

Figure 2-2 tells you Flight 2 will be taking off at precisely 6:17 and head west to bomb an enemy aerodrome. If Flight 2 encounters enemy aircraft, that's because you didn't take care of them. This screen also stresses the importance of timing. If you find yourself wasting time in the skies, being diverted from your mission objective, you're putting the lives of your fellow pilots at risk and not doing what you must do to accomplish your objectives.

Mission Planning

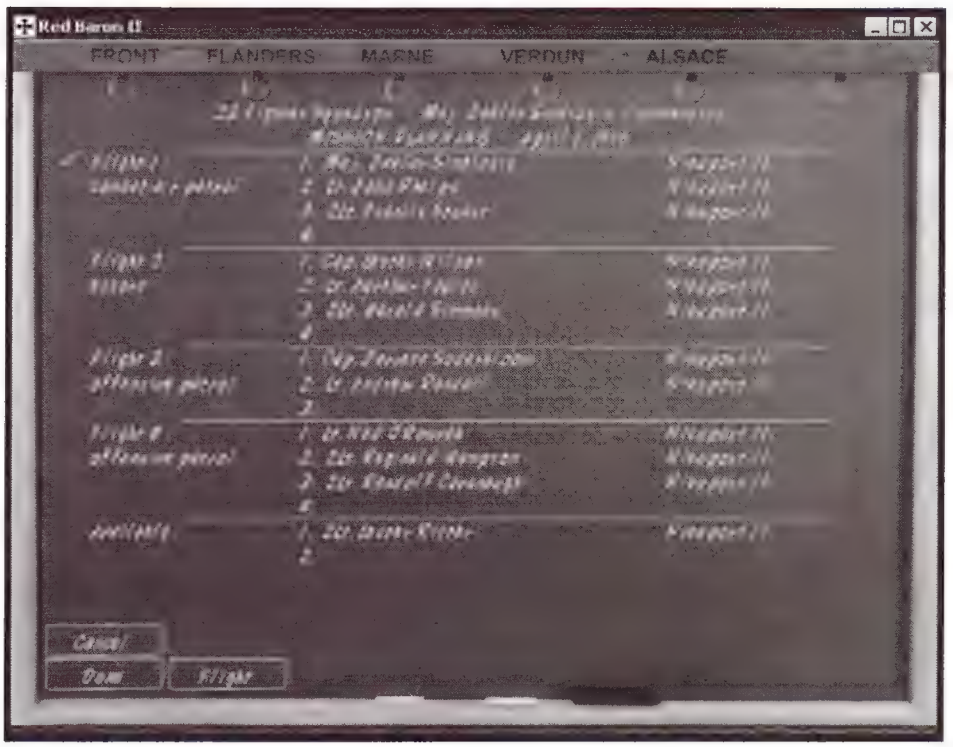


Once you've analyzed everything on the map and understand what your entire squadron is up to, you'll still have the opportunity to glean more information and make last-minute changes.

On the screen above you can alter the ammo your planes currently carry. Because you're about to embark on a Combat Air Patrol, you don't want to weigh yourself down with bombs and rockets, so make sure those boxes aren't checked. All you'll need is the standard machine gun, which allows you to fly light and fast in your quest for air supremacy.

Pressing the Squadron button takes you to the following section.

Squadron Planning



The Squadron Display offers a simple interface for better understanding the role of each flight making up your current squadron. From this screen you can determine the mission type for each flight, who's commanding each flight, who his or her wingmen are, and what planes he or she will fly in. If you're not the squadron commander, you can only look at this screen. However, if you're in command, you can come here to move pilots around.

This is also where your pilot research comes to fruition. As you can see, you're in charge of Flight 1, comprising you as flight leader and Phelps and Stuart as your wingmen. However, what if 2nd Lt. Lester Ritter, down in the Available section, were a more experienced pilot? Perhaps you should replace one of your wingmen with Lester. You may need to go back to the Pilot Dossiers to juggle your pilots effectively. It's always best to take your time at the beginning of your mission to ensure everything is exactly the way you want it. Once you've made the changes and you're in your airplane, there's

no going back. And you can move pilots from one flight to another, so again, make sure everyone is flying to their strengths. This screen can make or break the coming mission.

Once you have everything firmly in memory—you know when you're taking off, what you're expected to do, how soon you should do it—you're ready for the mission. Hit the Done button, and then Fly Mission, and you'll find yourself in the cockpit.

Anatomy of a Mission

Your mission has loaded and you're ready to begin. Your wingmen have just taken off, and now you must get your plane off the ground and begin gaining altitude. Remembering your mission planning, you know you should take off and circle the aerodrome until you've reached an altitude of 1,000 feet. As you climb, you also must get into formation with your wingmen. Let's do that now.

Figure 2-3

You're strapped in and ready to begin the mission.

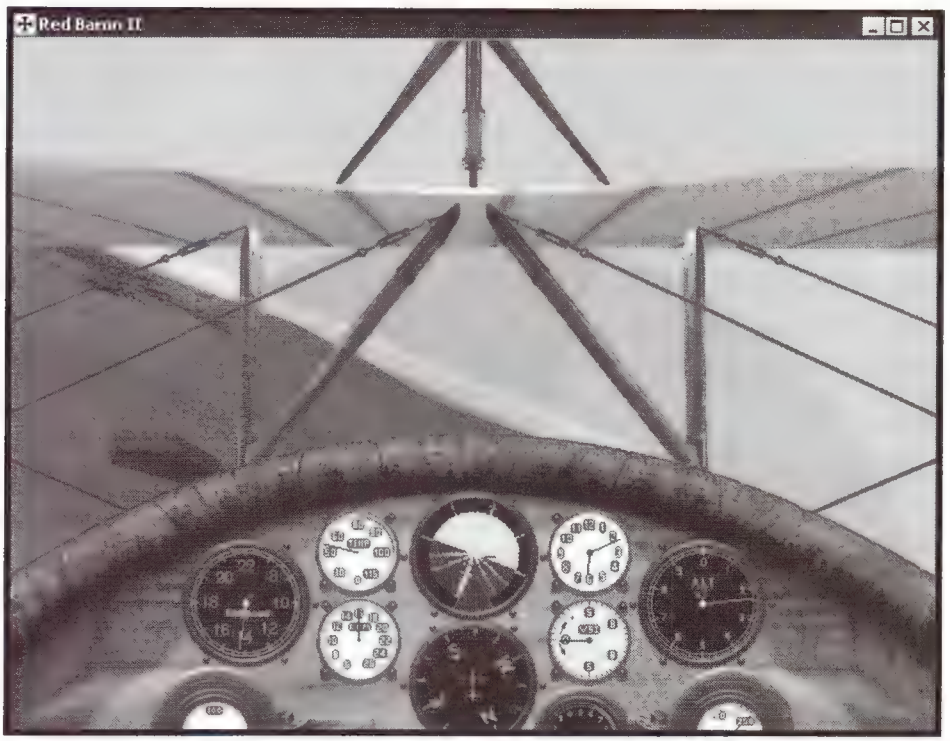


Figure 2-4

circling over the base and gaining altitude

Why is circling over the base to gain altitude better then simply gaining altitude on the way to the first waypoint? Good question. First, it allows you to get your flight formation in order so you don't have to worry about it as you venture toward the target. Second, if you gain altitude near the safety of your own base, you can progress toward the waypoint at a good, solid speed, ready for anything. There's nothing worse than struggling for elevation only to be surprised by enemy planes that already have an edge. If you arrive a potential conflict zone already at your elevation, you'll be on an equal footing with the enemy.

To be sure you're on course, press [5] (or [0] with the newer version) on your numerical keypad. This shows you a kneeboard where a red line indicates where you've flown. From figure 2-6 you can see you're nearing another friendly aerodrome, as well as the bridge. Hopefully, you'll see the enemies very soon, if they

Figure 2-5

Formation is set, you're at 1,000 feet, and you're heading toward your mission objective.

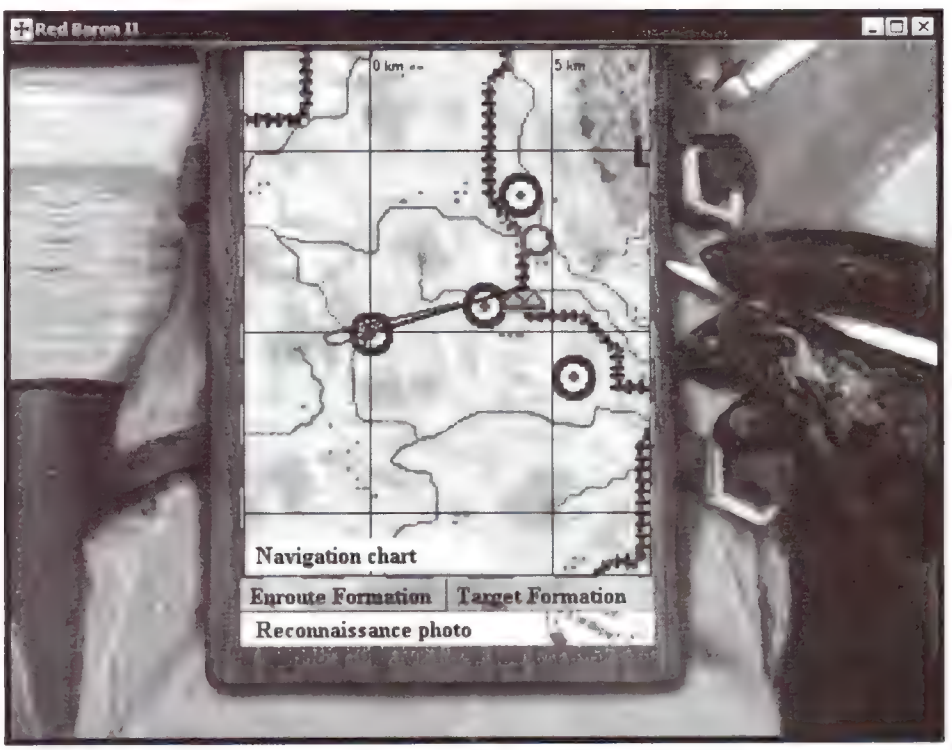


Figure 2-6

Tap-map navigation chart

decide to show up.

As you approach your primary objective (in this case, the bridge), watch for enemy aircraft. The best way to do this is simply to hit E. This instigates Padlock view. Padlock view is like seeing through the eyes of your pilot. Although you're still in control of the plane, you may find your viewpoint shifting from the direction you're headed to focus on a nearby enemy. Each press of E cycles through all available enemies and gives you a superb indication of where they are in relation to your heading.

Another effective way to scan for enemies is to press F3 or F4 on your keyboard. This gives you an outside view of your aircraft. Now all you have to do is press F9 and F12, joystick button 2, or Enter to rotate left and right. As you rotate, see if you can spot any enemies in the air. If don't see anything, keep flying toward your objective.

Now that you've arrived at the primary objective, your senses must be on full alert. The enemy could arrive at any minute, itching for a fight.

Unfortunately, after you've flown around for quite some time, the en-

Figure 2-7

over the bridge and searching for enemy aircraft

emy doesn't show. Because you're nearly out of fuel, you must head back home. However, although this mission lacked action, you can rest assured your other flights made it to their targets. Just because you didn't see any enemies in a mission doesn't mean they didn't see you. It's very possible that just your presence in Air Patrol near the bridge was incentive enough to keep them home.

To land successfully, you only need concern yourself with airspeed. You'll want to touch the ground going about 60 mph or slower.

Once you've safely returned home, drop your throttle down to the minimum and press Tab to turn your propeller off. Once it comes to a halt, you can end the mission.

The Mission Debriefing screen tells you if your mission was a success. In the case of the one you just flew, it was. Not only did you succeed, but your wingmen returned, as well. Furthermore, your planes were completely unscratched. You can't ask for much more than that.

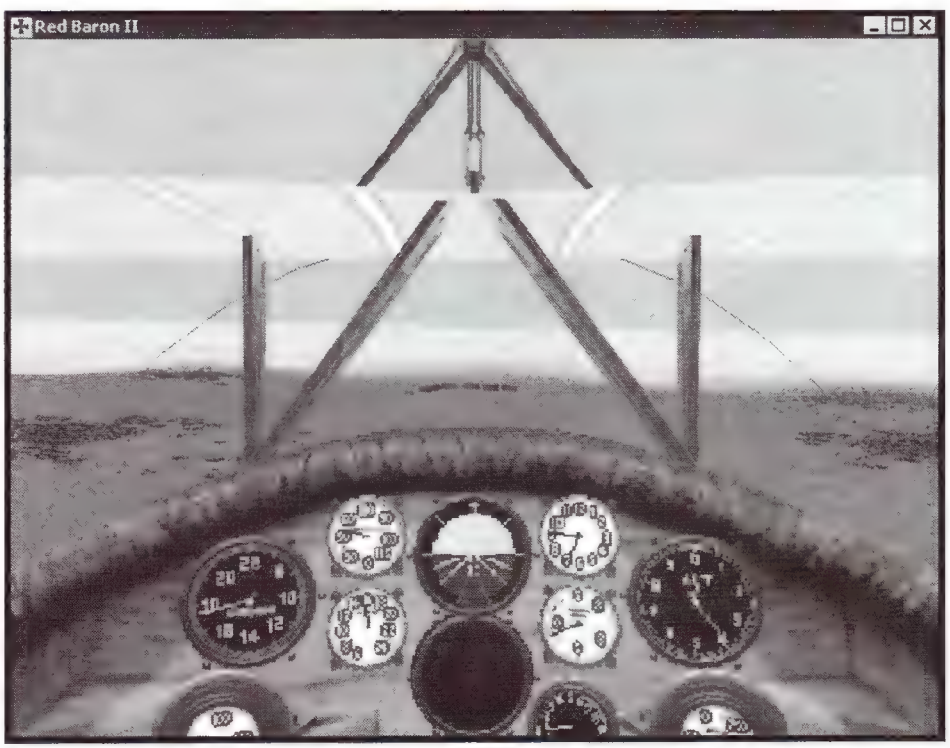


Figure 2-8

There's your home aerodrome.

Figure 2-9

You return home, safe and sound.

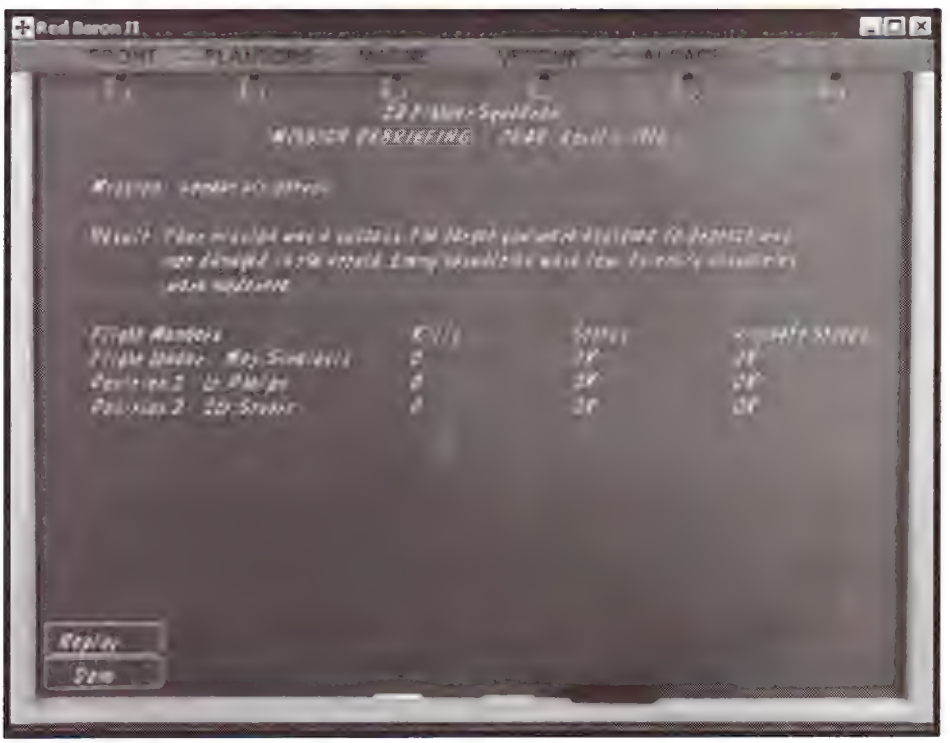


Figure 210

Mission Debriefing

Mission Strategies

Because of *Red Baron II*'s dynamic nature, you can't know what type of mission you'll face from one to next. There are some strategies you should keep in mind, however, no matter what your mission objective.

- Always ensure you've accomplished the primary objective before engaging secondary targets.
- Don't let enemy ground targets lure you away from the primary objective.
- Stay in formation as long as possible before engaging the enemy.
- Don't overfly the airplane. Occasionally, German pilots will attempt to lure you into a nose-dive. That's because German planes are typically better at sustaining stress than British or French ones. By luring you into a nose-dive, they hope to strip the wings from your airplane. You may be surprised how often you fall for this. Don't. Resist pursuits of folly. The good thing about the nose-diving enemy is that he or she loses precious altitude, an advantage you can use by sweeping down on him or her at a sustained rate of speed.
- When attacking observation balloons, fly left and right instead of a straight course toward the target. The straighter you fly, the easier you are to hit. It's better to attack observation balloons from a height advantage than from the same elevation.
- When attacking an enemy fighter that has a rear gunner, dodge! You're at a severe disadvantage against a rear-gunner. If you're in front, they have a shot. If you're in back, they have a shot. The best place to be is below and behind, so fight for altitude and gain the advantage.
- When flying over no man's land, watch for enemy artillery and flak. Maintaining a high altitude is a good bet, as is swerving in your flight plan. Staying on a straight course makes you far easier

to hit, and flying too low makes it easier for the enemy to bring you down.

- When attacking ground targets, throttle back if nose-diving on them and quickly throttle back up when it comes to climb. Keeping the throttle all the way forward while you nose-dive is a great way to experience flying without wings.
- If your plane sustains damage in a fight, do everything you can to get back to base safely. This may involve flying at a very low altitude and sneaking by your enemies. If nothing else, make sure you get your plane over friendly territory. That way, if you crash and survive, you have a better chance of winding up in friendly hands. A crash in foreign territory may result in your capture.
- When taking off, drop your nose down slightly so the rear strut comes off the ground. If the strut is dragging, you'll never gain speed. Don't dip the nose too far, though, or you'll find your plane flopping over—quite embarrassing.
- When dropping bombs, come straight down at your target with the throttle back and release the bomb a second before you must pull up; follow that with a throttle to the max position.
- Rockets are tricky weapons to master, and are pretty useless against air targets. Save them for big targets such as hangars and observation balloons. The best way to get a proper shot off is to fly at the same elevation as your target and fire at the last possible second.

Cockpit Basics

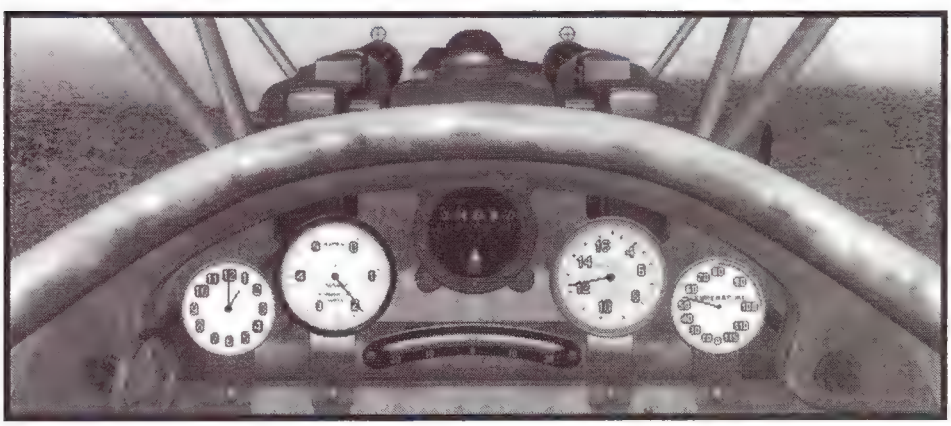
Straightening Up

From the original RAF *Pilot's Handbook*, 1918:

> *In turning, a pupil should put his nose down slightly by moving the control lever forward. He should then push the rudder and*

control lever over together in the direction he wishes to turn. When he wishes to fly straight again, he brings the rudder and the control lever back to the central position, or, in some machines, slightly over in the opposite direction, the opposite bank being applied first and the opposite rudder applied as the machine approaches a horizontal position: the quicker the turn the more the rudder and bank are required. The controls are centered when the machine is level. He should never turn slowly, as this maneuver may result in a sideslip and stall, which means that the machine loses its flying speed and gets into a tail-down position.

The Compass



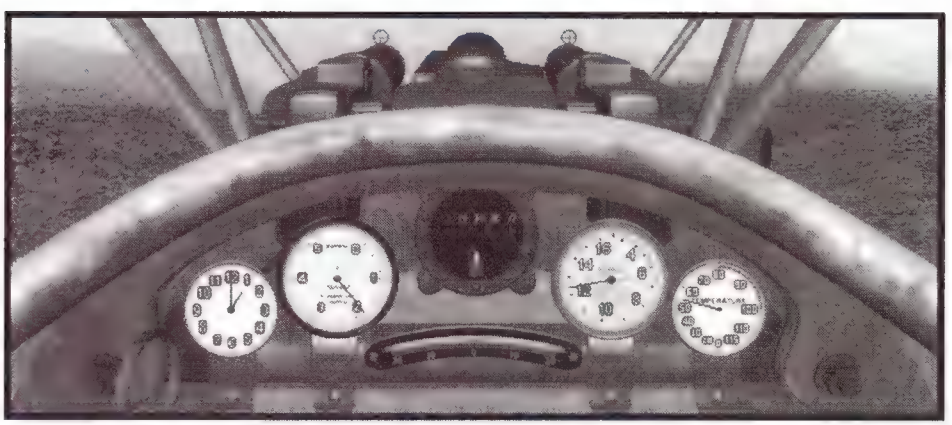
The compass is located in the very center of the dashboard.

From the original RAF *Pilot's Handbook*, 1918:

The magnetic compass is a most important addition to any airplane intended to be flown across country. It should be placed in full view of the pilot in the fore-and-aft line of the machine when in the flying position. The magnetic compass is an instrument for indicating the magnetic north, as the red end of the magnetized needle to which is attached the compass card always points to the

magnetic north. A mark is painted on the body of the compass, outside the bowl, in the direct fore-and-aft line. This is called the Lubbers Line. As the compass card rotates, caused by turning the machine in the air, the figures on it register with the lubbers' line and give the pilot the direction in which the nose of the machine is pointing from time to time. The compass card is a circular card and is divided into 360 degrees. The marking of the card is carried out clockwise, i.e., North = 360 degrees or 0 degrees; North-East = 45 degrees; East = 90 degrees; South-East = 135 degrees; South = 180 degrees; South-West = 225 degrees; West = 270 degrees; North-West = 315 degrees; and North = 360 degrees again. One point on the compass is equal to 11 degrees.

The Air Speed Indicator



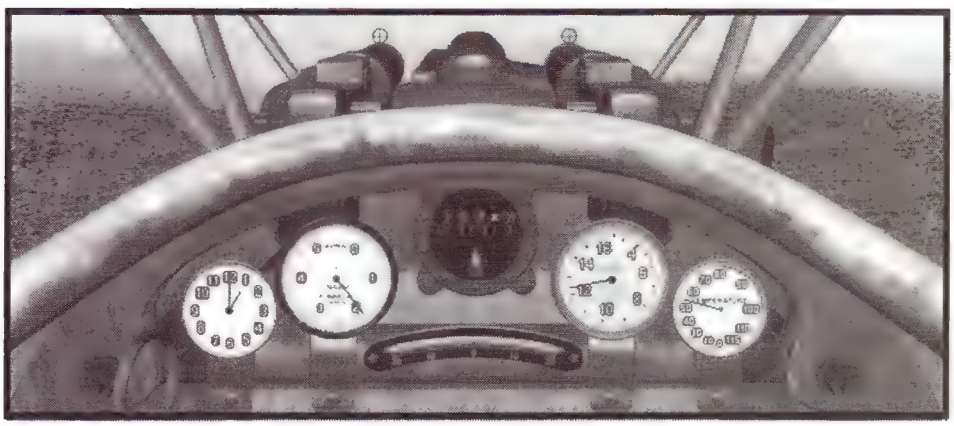
The Air Speed Indicator is located to the right of the compass.

From the original RAF *Pilot's Handbook*, 1918:

The air speed indicator is an instrument used to inform the pilot of his speed through the air and not over the ground. It consists, roughly, of two parts—the instrument and the pitot tubes. The tubes are fitted to the leading edge of the top wing, generally to

one side of the central fore-and-aft line of the machine, so as to be out of the way of the slip stream of the propeller, which would cause faulty readings. On a pusher or a double-engined machine, with the engines placed one on each side of the center line, the tubes could be fitted centrally, as the propeller draught wouldn't affect them. There are two tubes arranged either side by side or concentrically, one inside the other.

The Height Indicator



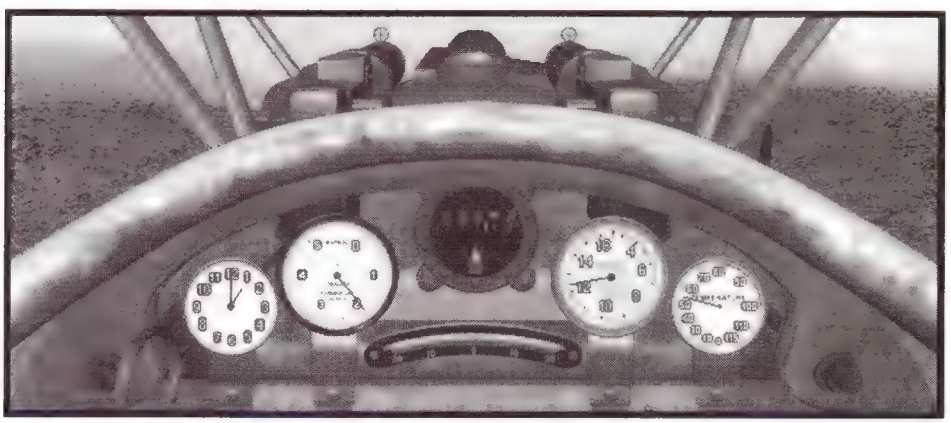
The height indicator is located to the left of the compass.

From the original RAF *Pilot's Handbook*, 1918:

The height indicator is operated by the pressure of the air, and is affected by variations of temperature. It consists of a dial marked off in hundreds and thousands of feet from zero to 10,000 ft. Or 20,000 ft., depending upon the scale and the type of work for which it was intended. The height indicator is always set to register zero at sea level where the machine is stationed, and it does not register ground level unless a special compensation is allowed for between the height of the aerodrome and the mean height of the ground. The height indicator is simply an aneroid barometer. The indicator needle is connected by suitable and very

delicate mechanism to an evacuated circular metal drum with corrugated top, which expands as the air pressure diminishes with height and actuates against a spring. It contracts again as the pressure increases, the spring transmitting the movement to the needle. The dial of the instrument is calibrated correctly in feet or meters, so as to give approximately correct readings of the amount of expansion or contraction of the exhausted drum. With both air speed indicator and height indicator there is a very considerable lag in their action, so that a reading of both instruments must only be taken as approximate at any given time.

The Sideslip Indicator



The sideslip indicator is located directly below the compass.

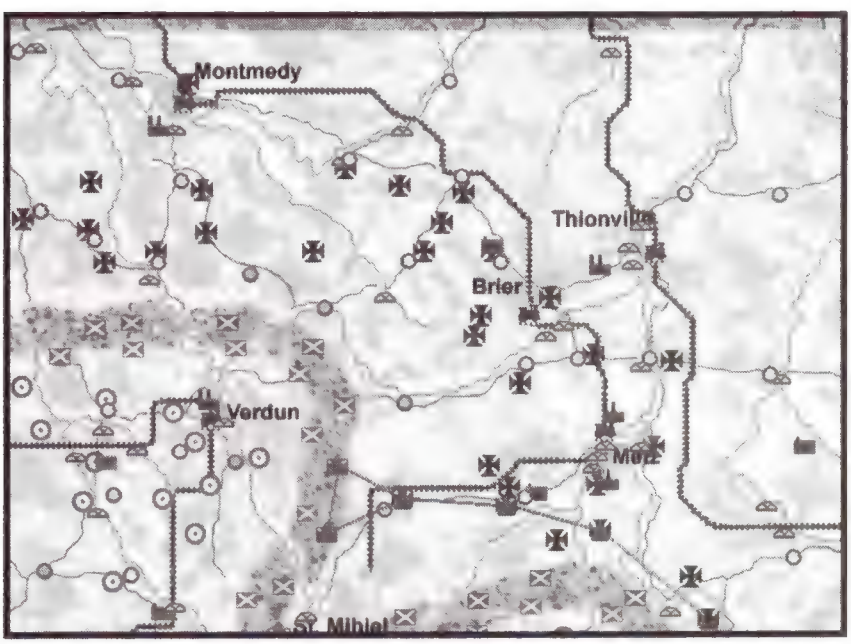
From the original RAF *Pilot's Handbook*, 1918:

When the machine is flying straight, or being turned with a correct amount of bank, the string will continue to trail straight back dead in the fore-and-aft line of the machine. If, however, it tends to trail out sideways, either one way or the other, it indicates a sideslip in the direction away from which the string is trailing. Thus, if the string is trailing out to the left from its anchoring point on a left-hand turn, it shows that the machine is slipping to the right

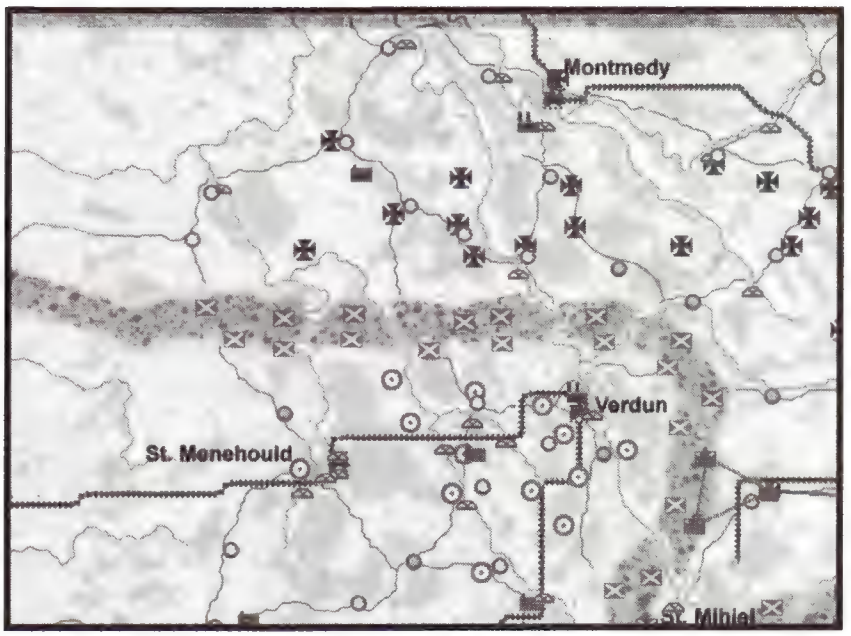
or outwards. If, however, it is trailing to the left on a right-hand turn, it indicates an inward sideslip to the right. The remedy in either case is more bank or less rudder. If the bank is too great, the bubble will go to the outside, while the liquid slips inwards. The cure is to put on more rudder or to decrease the bank. These remarks apply to all moderate turns, banked up to 45 degrees, and for all turns correctly executed, however steep. The use of this instrument in the air is likely to befuddle beginners than to be of any assistance to them. It is far better for them to learn to fly accurately by sight and feel or touch of the machine than to fly by the use of instruments, which, although useful as a means for checking the accuracy of their judgment in flying, are liable to mislead them and to break them down.

Maps of the Front

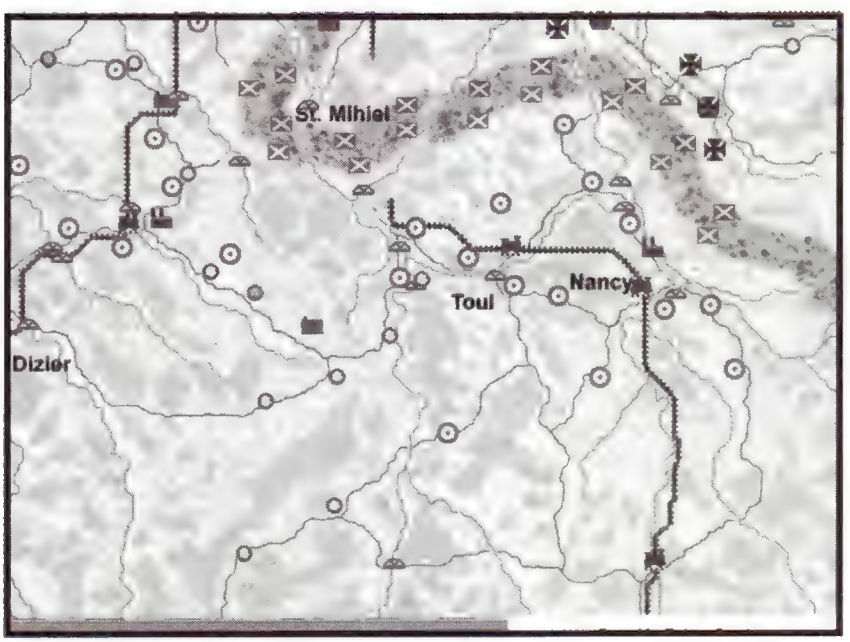
Verdun Region



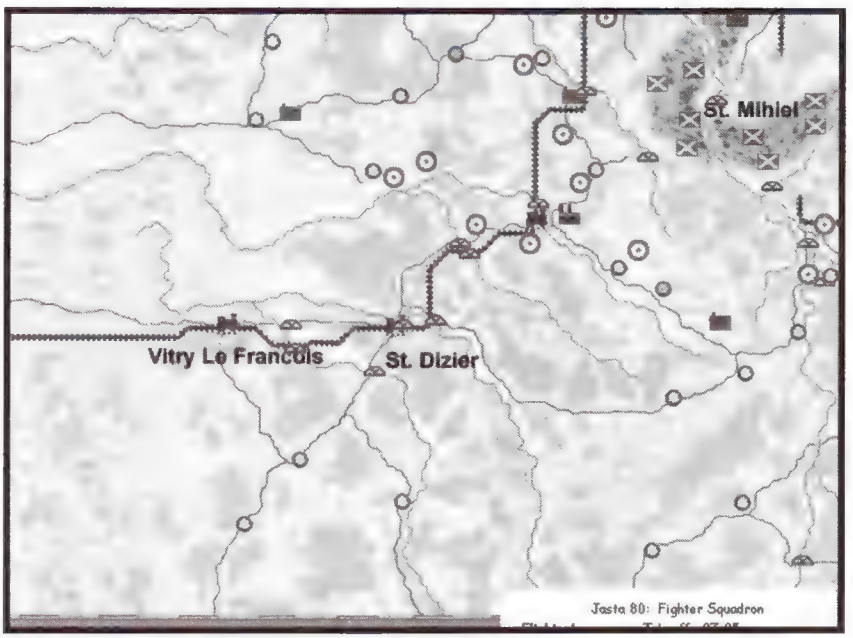
Verdun Northeast



Verdun Northwest

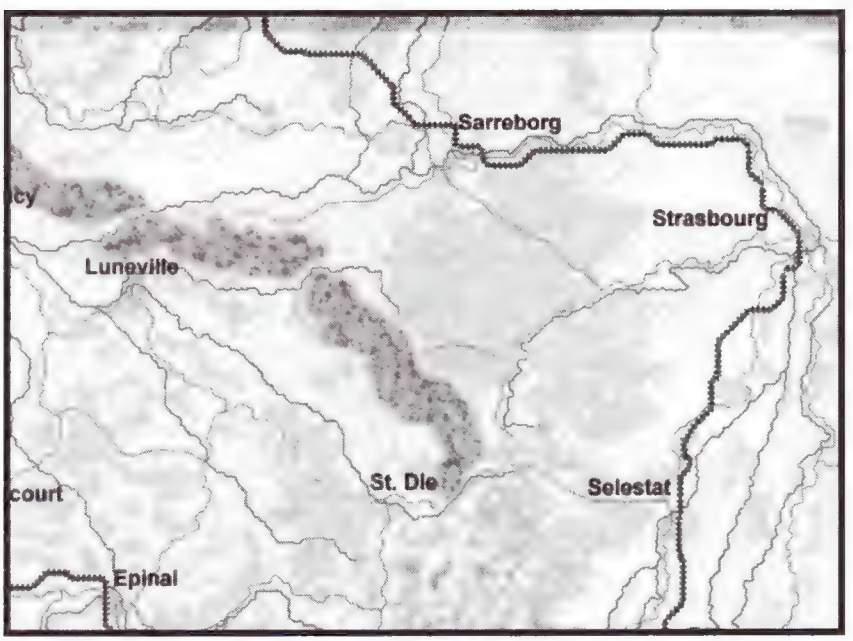


Verdun Southeast



Verdun Southwest

Alsace Region



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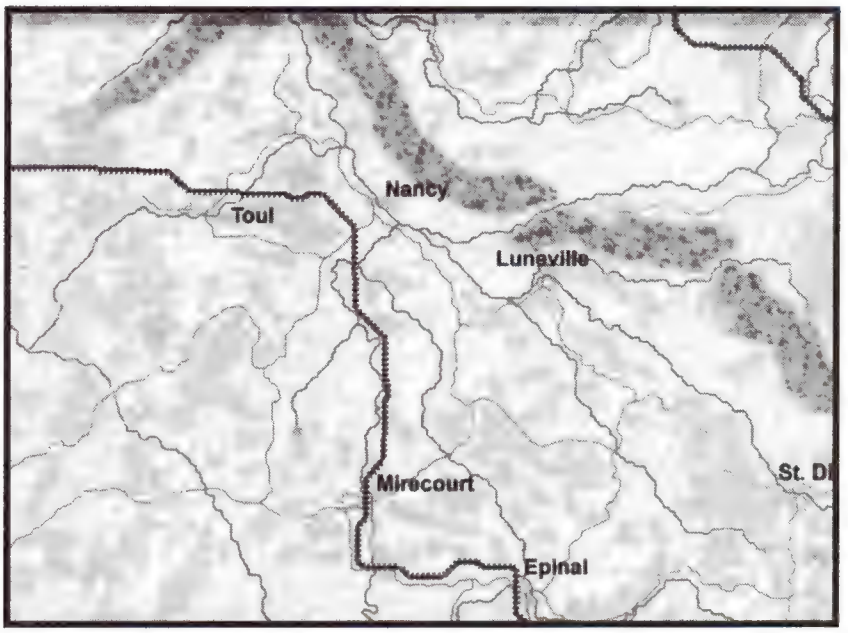

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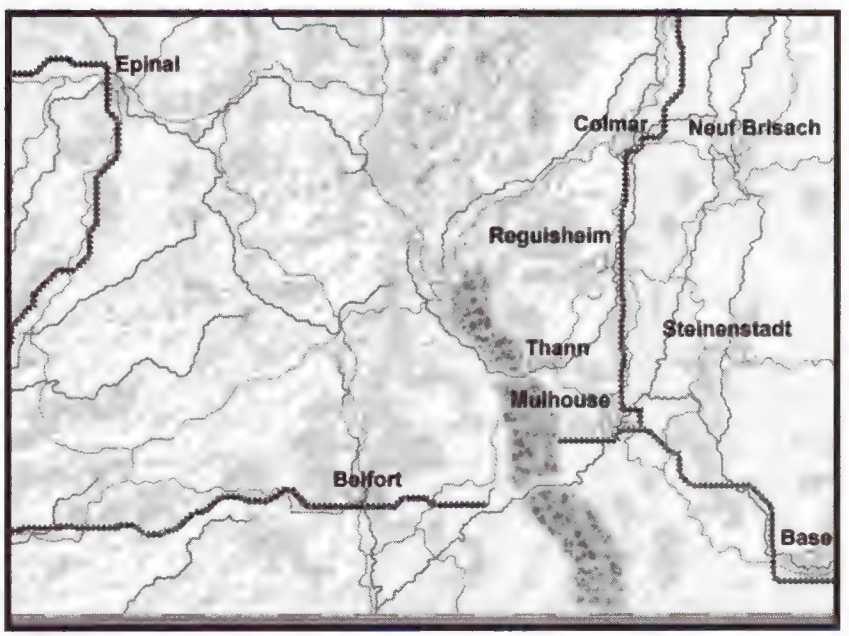

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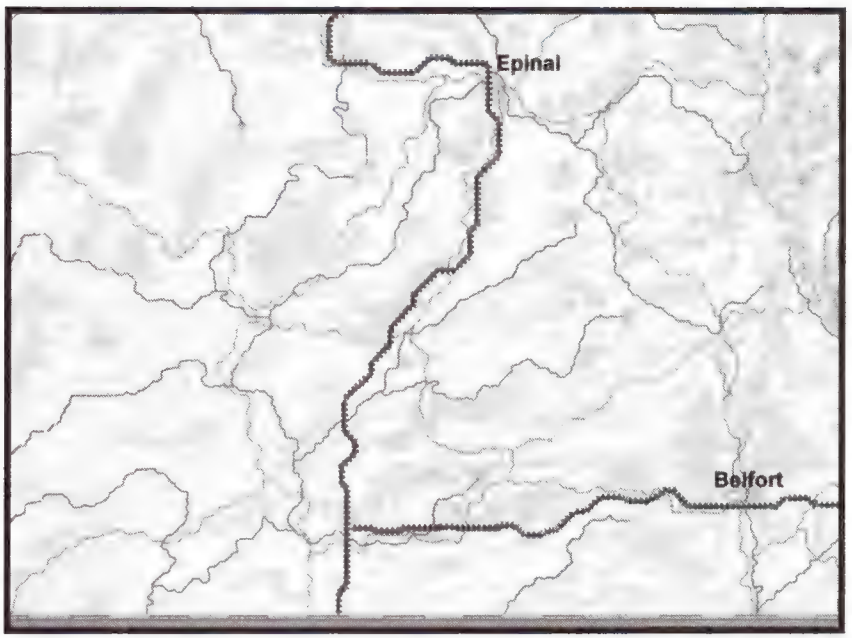

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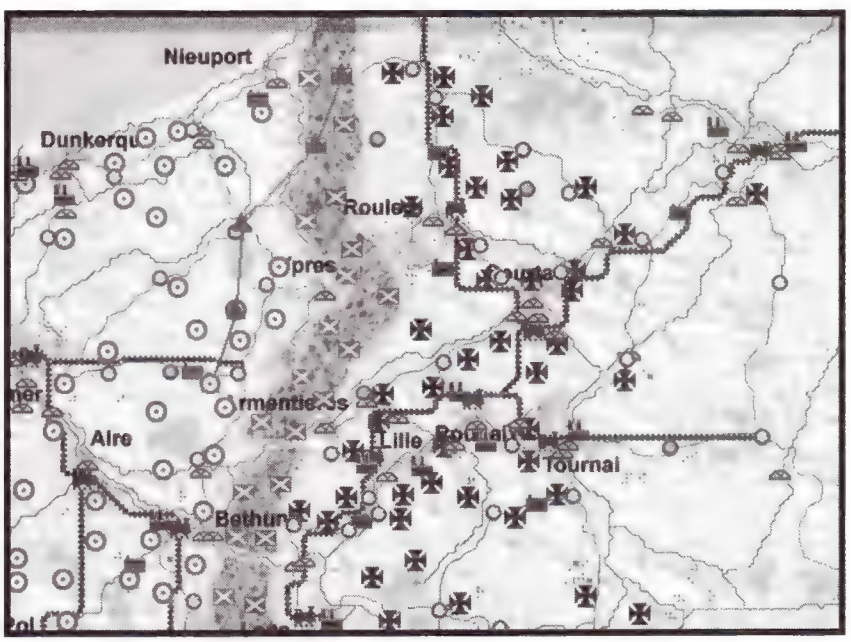
Flanders Region



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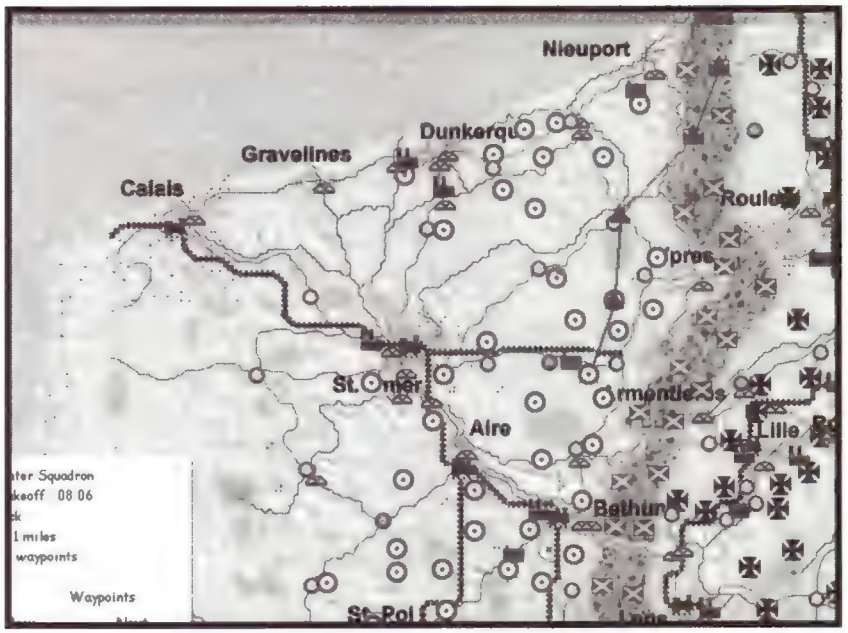

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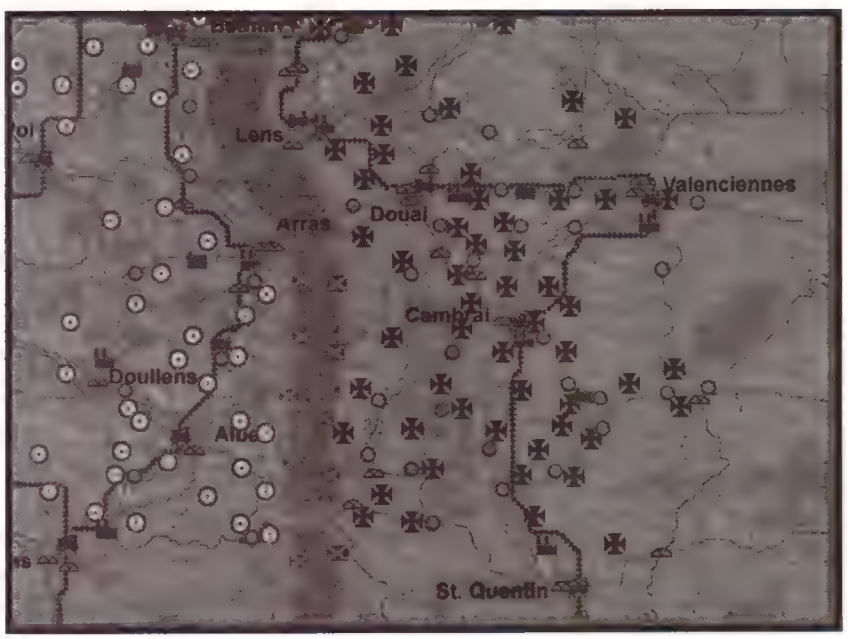

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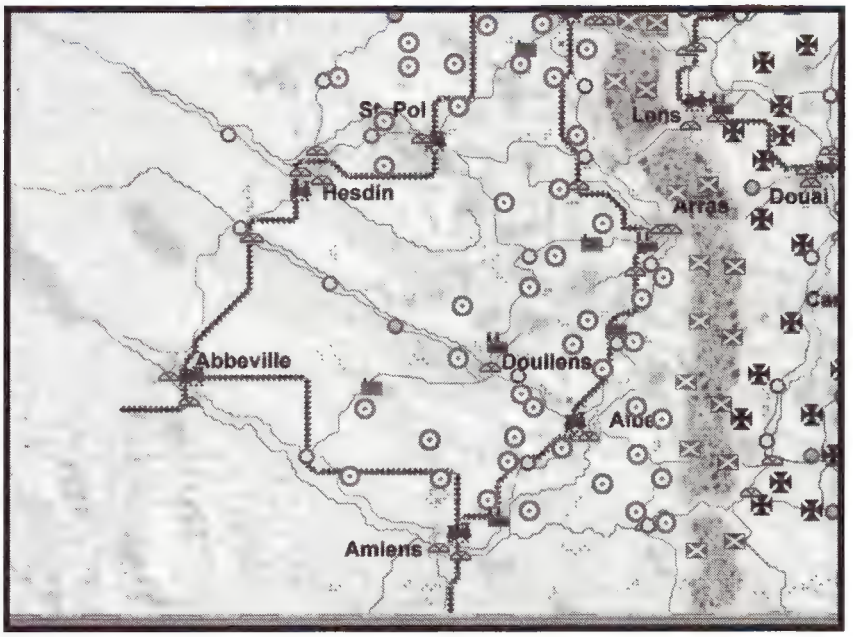
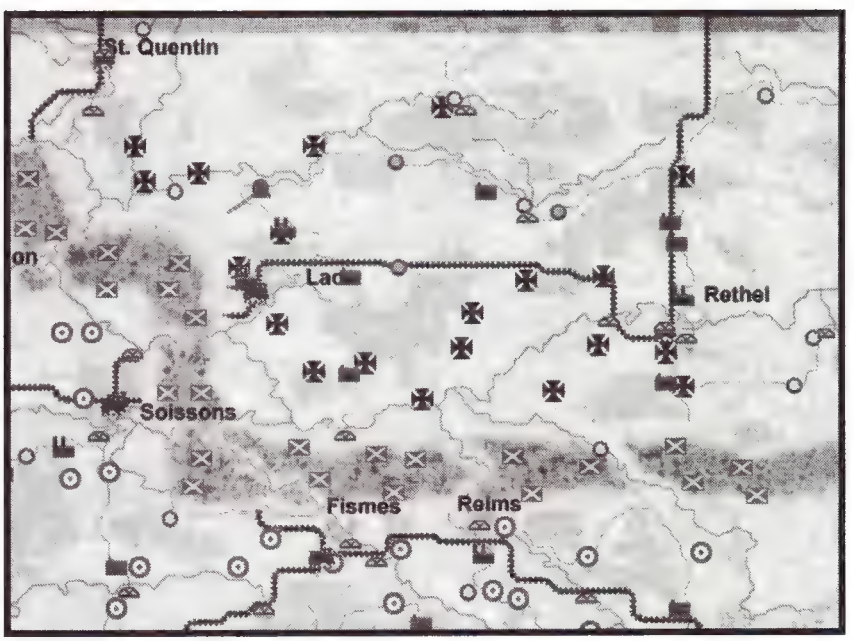


Flanders Southwest

Marne Region



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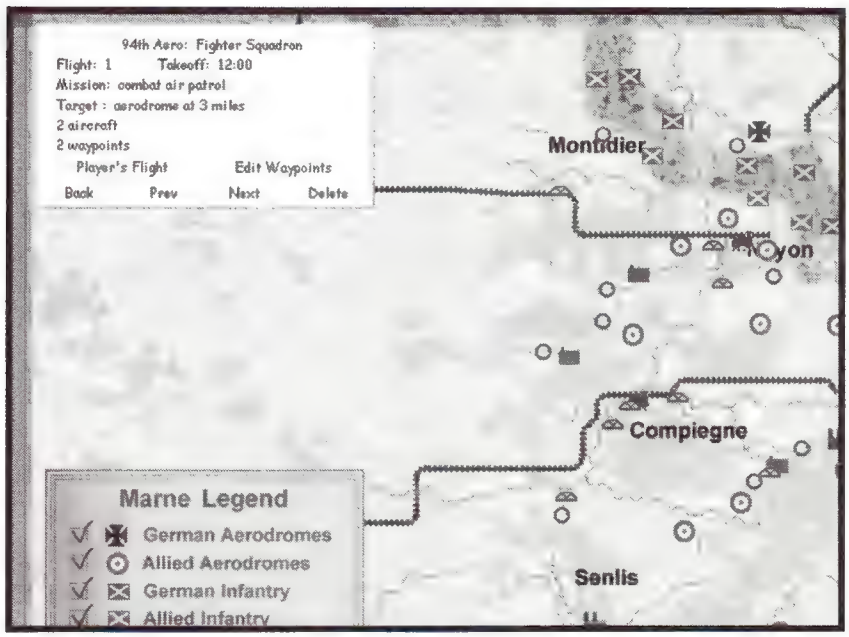

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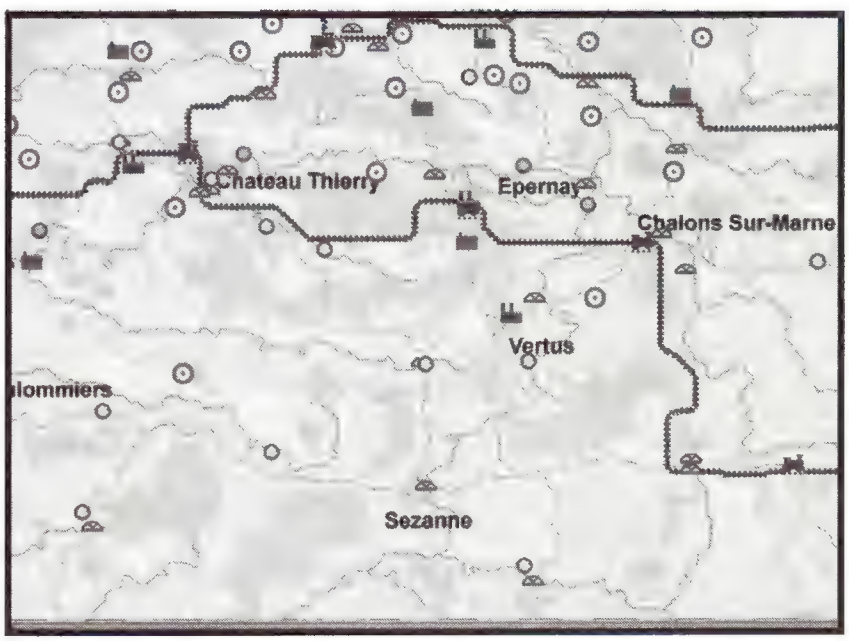

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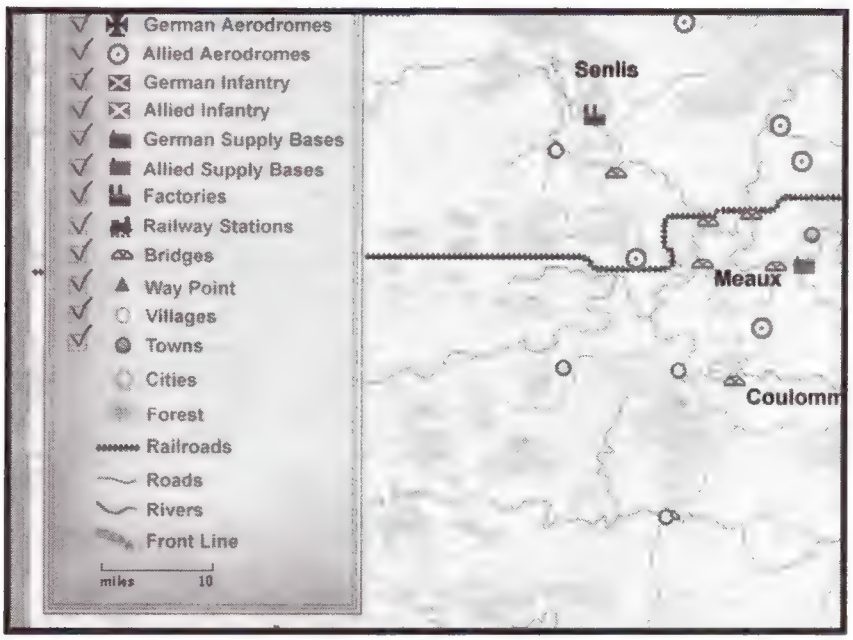
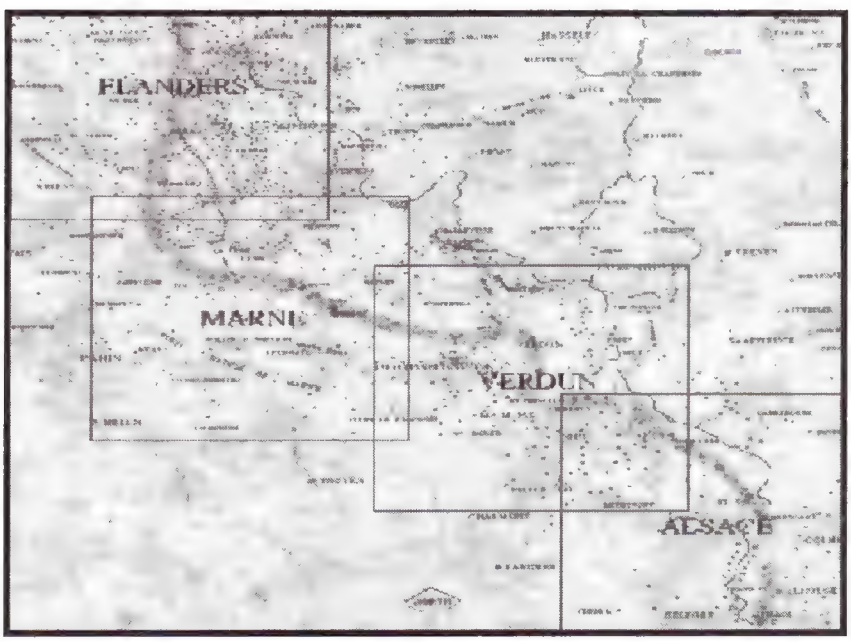


Marne Southwest

The Front



Map Legend

German Aerodromes
Allied Aerodromes
German Infantry
Allied Infantry
German Supply Bases
Allied Supply Bases
Factories
Railway Stations
Bridges
Way Point
Villages
Towns
Cities
Forest
Railroads
Roads
Rivers
Front Line

3

Multiplayer

Red Baron

The World of Multiplayer

It's incredibly difficult to program an enemy pilot to act and behave like a human, but the Dynamix team has done a great job with the enemies in *Red Baron II*. As much fun as the single-player mode is, however, the Multiplayer mode is even more so. Playing *Red Baron II* over the Internet with a fellow human is perhaps the game's single greatest aspect. You're up against a real human. A human who will act and behave very unpredictably, and you must learn to react to that unpredictable behavior.

One thing you'll realize very quickly is that each human pilot has his or her own style. Some will depend on quickness, some will be patient. Some will hang back on the periphery of battle and wait for a tactical error before pouncing on you. Some are expert shots with a machine gun; others will take

Figure 3-1

Now entering... Multiplayer!

great delight in simply ramming your plane with their prop. One thing holds true however: You're in for the fight of your life.

Red Baron II Multiplayer lets you experience the excitement of World War I air combat against humans, across the room or across the world.

Red Baron II Multiplayer can be played by one team against another, every player for him- or herself, or even solo, to get used to the *Red Baron II* Multiplayer world. Depending on the type of game, you may be assigned to destroy a number of enemy targets, or just to try to shoot down as many enemy planes as possible.

There are game difficulty options to suit different skill levels. You can set up the game to let you take off and land automatically, turn off enemy antiaircraft batteries, and give you unlimited lives and ammo. Or you can choose the most realistic difficulty settings and g-force structural damage to your airplane.

You can chat with the other players throughout the game to choose teams, set game options, communicate your position during flight, and postmortem the game when it's over.

Signing In

Upon starting *Red Baron II* Multiplayer, you'll be asked to create a new pilot name you'll use entirely for online play. Take some time to think of a good one. It will become known to all you meet. Make it something memorable and engaging, something that perhaps instills your enemies with a certain dread. Your online pilot will begin to create his or her legacy through the exploits of online play.

Once you've chosen a name, it will appear on the pilot roster with blank entries for Mission and Kills. These fields fill as you complete successful Multiplayer missions and bring down your fellow pilots.

At this point, you can either fly solo and get some experience before going up against your fellow pilots, or you can dive straight into the Internet and strut your stuff.

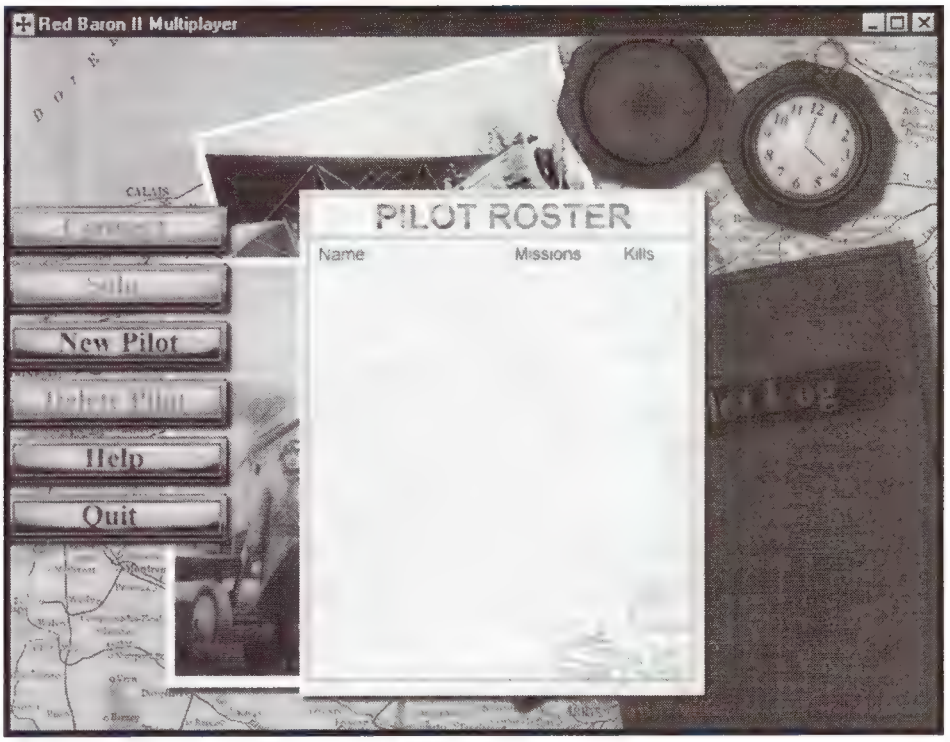


Figure 3-2

sign-in screen

Connecting

After you select Connect, you'll have several gameplay options. Let's take a closer look at each.

First, Internet Play is by far the best option, if you have the proper system. All you need to play is an Internet connection.

You can play IPX/LAN with several computers linked over a network or using some kind of program such as Kali95, which emulates a LAN network. Although Kali95 doesn't offer the speed of a true LAN connection, playing over a LAN is by far the smoothest experience you can hope for. The problem is not many people have access to a LAN, unless they're playing after-hours at work, where LANs are common.

Modem Play allows you to call up a friend and dogfight head-to-head. However, Modem Play limits you to just two combatants.

Serial is similar to Modem Play, except each computer is linked by a cable and you're again limited to two players.

Again, your best choice is Internet Play. It offers a wide range of combatants and allows you to play against several people at once.

Multiplayer Game

In a multiplayer game, the host selects most options after chatting with the other players to determine their preferences.

To chat with other players, type your message and press Enter.

Messages from other players display in the chat window in the lower half of the screen. To set game options (host):

1. Choose a team for each player, if this is not a melee game. You can change a player's team by clicking on the player's name.
2. Click the Difficulty button to set the game difficulty level.
3. Click the Game Type button to choose a game type.
4. Click the Friendly Fire button to turn friendly fire on or off.
5. Click the Arcade button to turn Arcade mode on or off.
6. Choose your plane by clicking on it in the Available Aircraft list.
7. Click the Play Game button to start the game. There must be at least one player on each team before this button is enabled.

To set game options (guest):

1. When the host has selected your team, choose a plane by clicking on a plane in the Available Aircraft list.
2. Click on the Play Game button when it is enabled to start the game.

To set game options (solo game), follow the foregoing instructions for the Multiplayer host.

Using the Map

Use the kneeboard map to find out where you are, and the direction you're flying in. The airplane icon indicates your position and heading. The map shows the locations of all targets and aerodromes (although it doesn't show whether they've been destroyed). The map gridlines let you communicate your position to other players ("Hey Ralph, I'm over at A2 and I could use a hand!"). Your plane continues to fly while you're viewing the map.

To view the kneeboard map, press keypad [5] (or [0] with the newer version). To return to normal view, press it again.

Ways to End the Game

Winning or losing:

- Taking out all the requisite targets or shooting down all enemy planes
- Being the last active player, or when there are no active players on the enemy side
- Dying*
- Quitting
- Disconnecting

When the game is over, go to the Game Summary screen to view the results of the battle. This screen displays the number of targets destroyed and remaining for each team, as well as the number of planes each side shot down. From this screen you can quit the game or go back to the main screen to start another game.

* In a game difficulty with limited lives, you can die. When you're dead you can spend the rest of the game as an observer, flying around the game world to watch the other players.

Multiplayer Keyboard Reference

right-click on mouse, press "start new life": restart after crashing

Esc: end mission

P: toggle pause (Single-player or Observer mode)

S: toggle sound

Shift + C: change status display color

Shift + D: toggle status display

Shift + M: toggle ammo type

Shift + N: toggle pilot names

Shift + V: toggle graphical/text status display

Backspace: start chat message

Enter: send chat message

Spacebar:fire machine guns

R: fire rocket

B: drop bomb

1 2 3 4 5 6 7 8 9 0: set throttle (10-100%)

+ /−: increase / decrease throttle

Views

F1: forward lockdown view

F2: cockpit slewable mode

F3: external slewable mode

F4: external camera mode

F5: external chase plane

F6: external delayed chase plane

F7: remote control/fly-by view
F8: target view
keypad 8: forward lockdown view
keypad 4: left lockdown view
keypad 6: right lockdown view
keypad 2: back lockdown view
Page Up: look up
Page Down: look down
5, or 0: kneeboard map
F9: rotate up
F10: rotate left
F11: rotate right
F12: rotate down

* F9 – F12 are only usable while in slewable view.

Rearming and Repairing Your Plane

To repair your plane:

1. Land anywhere and come to a stop. Repairs happen automatically.

To rearm your plane:

1. Land at a friendly aerodrome and come to a stop. Rearming occurs automatically.

Leaving the Game

To leave the game:

1. Press Esc to bring up the Leave Game dialog box.
2. Click Exit.

To become an observer:

1. Press Esc to bring up the Leave Game dialog box.
2. Click Observe. You'll go into Observer mode, which lets you move around the world to see the action, but you won't be able to return to your plane and are effectively out of the game.

To exit the program, click the X button at the upper-right corner of the window.

Destroying Targets

A target is destroyed when bombs, rockets, and machine-gun fire inflict a certain minimum amount of damage on it. The amount of damage required to destroy a target depends on the game difficulty.

When a target has been destroyed, all its buildings collapse so that its status is obvious.

It doesn't matter who destroys a target; if you destroy a friendly target, the opposing team gets credit. Checking your position on the kneeboard can avoid helping the enemy cause.

You can attempt to destroy enemy aerodromes in order to take away rearming locations, but they aren't considered targets with respect to winning the game.

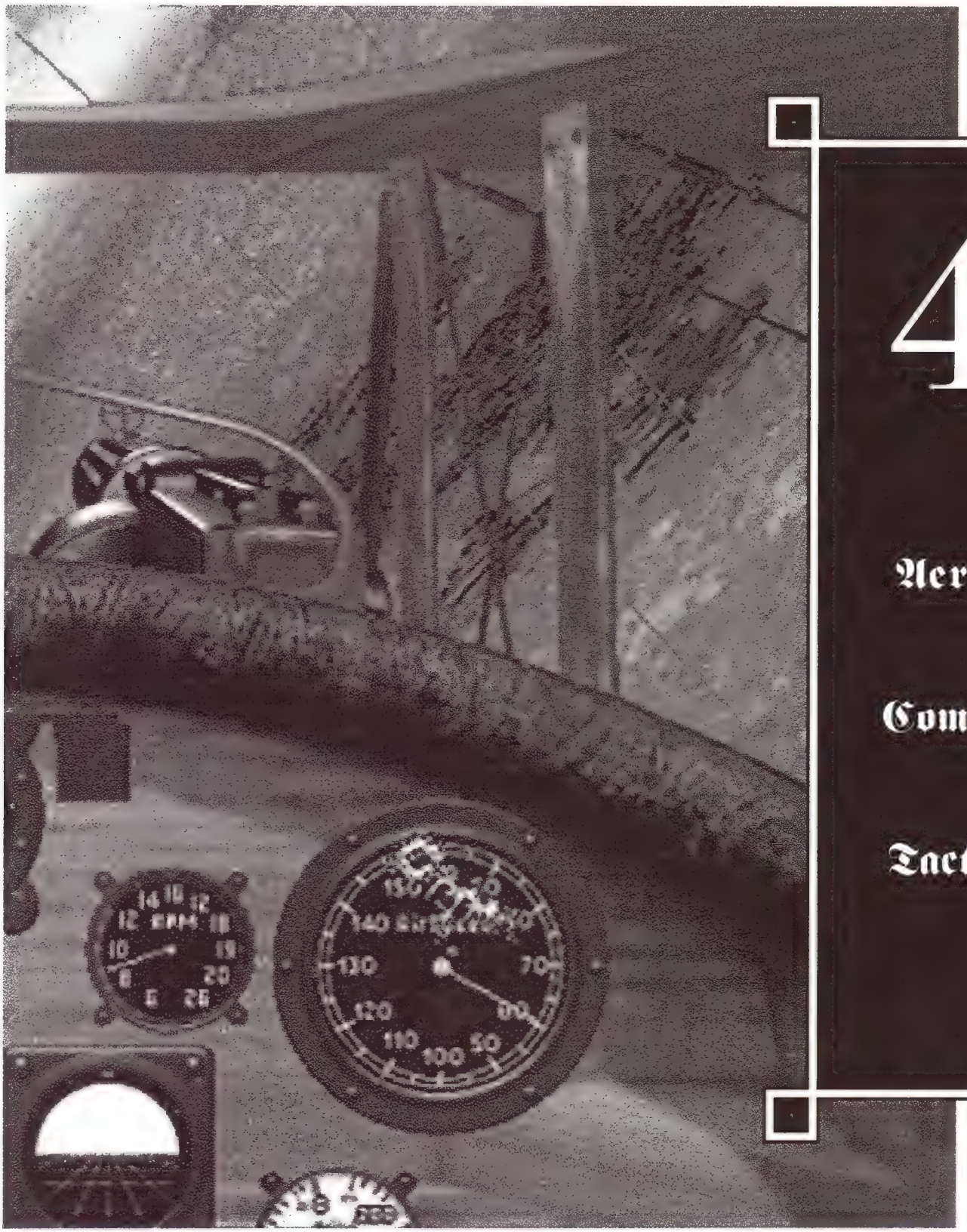
Each time a game is started, targets are randomly placed on the world, depending on game type and game difficulty.

Locating Other Planes

In a team game, each team starts above a randomly selected friendly aerodrome.

In an individual melee game, each player starts around a forward-facing circle in the center of the map.

After the game has begun, the only way to find out where the other players' planes are is by looking for them or by asking the players.



4

Aerial Combat Tactics

Fundamentals of Flight and Aerial Combat

You have a single priority in a combat situation—self-preservation. Better to leave a nasty situation and live to fight another day than hang around and become one with the ground. It's the foolish pilot who flies with only aggressiveness as a guide.

Living to Fight Another Day

Your combat missions will be, by definition, extremely dangerous. One day you may be asked to venture into the wild blue yonder and protect a squadron of bombers from enemy attack; the next you have orders to bring down an observation balloon.

No matter what the mission objective, you can be certain of one thing—your life will be threatened. Even when a mission seems like a simple affair, danger is always around the corner...usually when you least expect it. It's a precarious balance all fighter pilots must come to terms with. The mission objective ultimately may save the lives of many people and advance your country's goals, but it shouldn't cost you your life unnecessarily. The war will continue, and it's always better to recognize when the odds are against you and flee. Needless heroics put your life in jeopardy and risk the loss of a very expensive plane. Wise decision-making will save both, and ultimately culminate in victory.

Sometimes dogfighting a worthy opponent will cause damage to your plane. This damage may be superficial—a shattered dial, for example—or it may spell disaster—a shredded wing. The wise pilot can assess a situation quickly and determine rationally whether continuing to fight is a smart move. Don't let rampant hubris prolong a fight you should attempt to disengage from. If your plane has sustained moderate damage, attempting to continue fighting usually will lead to your death. If possible, disengage and attempt to ditch the plane safely (if you have any control left). Or you can attempt to bail out at the last second before impact, although this is rarely survivable.

Remember, there were few parachutes in World War I, so any attempts at bailing out are destined to be a lopsided affair.

Speed Life

If you have one motto while playing *Red Baron II*, it should be "Speed = Life." The faster your plane is traveling, the more moves you have at your disposal, including the most beneficial—gaining altitude. The importance of altitude can't be stressed enough. Without it, you're a sitting duck, especially if enemy fighters are circling overhead. They have the luxury of zooming toward your plane with a high closure rate, while you're stuck struggling upward, your engine straining with each foot of climb, all the while risking a fatal stall. Therefore, at the moment of takeoff, your first objective should be to attain a high altitude and maintain it until mission objectives dictate otherwise.

While a high speed is essential for several tactics, it can also work against you, generally in heated dogfights. Many inexperienced pilots have the impression that a plane turns faster at a high speed. Nothing could be further from the truth. The higher the speed, the wider your turn. The lower your speed, the tighter the turn. Simple. When an enemy is on your tail and you want to remove him from such a dangerous position, throttle back. This allows your plane to swivel around and hopefully gain sight of your foe. And high speeds in a combat situation can be lethal. Combat is the great unknown and maneuvers are often incorporated on the fly. Too much speed can strip your wings from your plane if you begin a dive during combat. Constantly monitoring your airspeed is essential if you plan to live to another day.

Figure 4-1

Always keep an eye on your airspeed.

Flight Situations

Losing Control

Losing control of your aircraft is inevitable. Most inexperienced pilots simply panic once the plane develops a mind of its own. They fight with the stick, trying this, trying that, until they find themselves plummeting toward the ground, well beyond any hope of salvaging their craft. To avoid this predicament, experiment with losing control of your craft and then getting it back again safely.

Load up a single mission from within *Red Baron II*, but don't concern yourself with mission objectives. You're just going to fly around a bit and try a couple of things out. Once you find yourself in a plane, climb to an elevation of 5,000 feet and settle into straight-and-level flight. Now throttle back until the engine has no power. After a few seconds your speed will have

Figure 4-2

An uncontrolled spin can be a deadly experience.

dropped to around 35 mph and your aircraft will begin to stall. The nose of the aircraft will drop even though you're pulling back on the stick. Soon you'll have brought the stick back as far as it will go, but the nose of the plane will still point toward the ground.

Recovering from a stall is easy: Simply wait until your airspeed reaches about 50 mph, gently pull back on the stick, and you'll soon be back at straight-and-level flight. Wait too long, however, and your increasing airspeed could strip the wings from your plane.

If your plane was rolling or yawing when you began the maneuver, your aircraft is likely to enter a spin. This can be guaranteed by applying and maintaining full rudder when the spin starts. Recovering from a spin is a little trickier: Release the stick, wait for rotations to cease, and then release the rudder. Allow for airspeed to build up to about 50 miles per hour and gently pull back on the stick.

In the foregoing example, the spin occurred at a low speed. In combat, spins generally will occur at higher speeds. Try this: Select Full Power and climb to about 8,000 feet. Roll the aircraft into a vertical (90-degree) bank. The aircraft will begin losing altitude, so pull back on the stick. Keep tugging on the stick to tighten the turn. At some point you'll lose control; depending on aileron input, the aircraft will spin either into or out of the turn. Neither situation is desirable in combat, so focus on maintaining control rather than on recovering once control is lost.

If you're going to maintain control of your aircraft during air combat, some understanding of the theory of flight is mandatory. First, let's define some terms. An aircraft wing is designed to provide a "lifting force." When the force is greater than the weight, the aircraft will go up. The amount of lift provided by the wing depends on the following factors:

Shape: Some wings are better lifters than others.

Velocity squared: The faster the airflow, the greater the lift.

Angle between wing chord and airflow: This angle is commonly called the angle of attack.

If an aircraft flying straight-and-level slows down, lift will decrease and the aircraft will go down. To maintain level flight, the pilot compensates for loss of speed by increasing angle of attack. Pulling back on the stick does this. At some point, however, increasing the angle of attack no longer increases lift. At this critical point, known as the "stall," lift starts to decrease as the angle of attack increases.

Practice vertical turns by simultaneously rolling the aircraft close to 90 degrees and pulling back on the stick. Ideally, using the rudder will compensate for any tendency to roll out of the maneuver. You can also use the aileron, but then you risk stalling the top wing and spinning out. Maintain full thrust and balance with aileron, elevator, and rudder controls to turn as tightly as possible to the limit—until you can turn on the "edge" but retain control.

Practice these critical situations and master control of your aircraft, and you'll face the stresses of aerial combat with confidence.

Straightening Up

In turning, put the aircraft's nose down slightly by moving the stick forward. Then push the rudder and control lever over together toward the direction you want to turn. To fly straight again, bring the rudder and control stick back to the central position, or, in some aircraft, slightly over in the opposite direction, the opposite bank being applied first and the opposite rudder applied as the machine approaches a horizontal position. The quicker the turn, the more rudder and bank you need. The controls are centered when the machine is level. Never turn too slowly. This maneuver may result in a sideslip and stall—that is, the machine loses its flying speed and gets into a tail-down position.

Landing

Unlike traditional jet aircraft, landing a biplane is usually a simple affair. However, it's not without risks, so treat this aspect of flight with great care.

Figure 4-3

Your speed should be at the bare minimum for a successful landing.

First, when approaching your aerodrome, make sure your line of sight is clear of obstacles (trucks, hangars, trees, and the like). When you're certain the path is clear, throttle back to about 80 percent power and begin a slow descent, constantly monitoring the ground for obstacles. When you reach an elevation of 100 feet, begin throttling back to about 20 percent until your plane slows considerably and the nose begins to drop. At this point, throttle all the way back and keep your nose pointed upward as you slowly glide toward the ground. Eventually, your wheels will touch and you'll come to a halt.

The art of landing consists wholly of accurately timing the relative position of the ground and the machine; the eye must work in perfect unison with the hand. A note of caution: At low rpms, aircraft engines can become slightly unstable, sometimes cutting out altogether. If this occurs, throttle up until the engine comes back to life and seek a balance until your wheels touch the ground. We can't overstress the importance of straight-and-level flight during a landing. If your machine is banking at a slight angle, chances are good that when the wheels touch the ground, you'll be tossed into a spin, possibly overturning your plane and starting a fire.

To achieve perfection in landing, we recommend you practice "landing on a mark." For the most part, you'll simply find yourself landing on long stretches of open territory. Too much of this can weaken your proficiency as a pilot. It's far better to know you can bring your plane down anywhere you want to, and to become expert at it. To practice a skilled landing, pick a location and determine to land on it. Perform this again and again until you're confident of your skill. The more self-confidence you wield in all aspects of flight, the more lethal you'll be in the air.

There are two landing faults a pilot must beware of; one is much worse than the other. First, a pilot can fail to flatten out and thus fly right into the ground, in which case you'll smash your plane and flip it over. Or a "pancake" may result (simply a stall). If the pancake isn't pronounced and happens close to the ground, chances are good a craft can avoid serious damage. A serious pancake will damage the undercarriage. The worst pancake takes place when the aircraft loses its flying speed at a height of 20 to 30 feet and develops a powerless stall, spinning the airplane to one side and bringing it onto the ground wing-first, resulting in a life-threatening fire. Possible ways out of such a potential catastrophe include putting the nose of the machine down to regain some airspeed, or throttling up the engine and attempting to pull out. An expert pilot could put the airplane on the ground by pushing the stick forward, nosing down for an instant, and then quickly pulling back as the wheel approaches the ground.

Aerial Combat Tactics

> *He must be able to loop, turn his machine on its back, and do various other flying stunts—not that these are actually necessary during combat but from the fact that he has done these things several times and has absolute confidence, and when the flight comes along he is not worrying about how his machine will act. He can devote all his time to fighting the other fellow, the flying part of it coming instinctively.*—Bishop

In a combat situation, most fighter pilots considered anything more than a tight turn to be too exotic. Richthofen was uninterested in aerobatics and said he'd never perform a loop. He was more interested in a pilot's positive attitude and shooting ability. However, some maneuvers are useful and, as Bishop said, practicing aerobatics gives the pilot confidence.

You must be very careful when performing aerobatics in combat. There's a very real danger you'll concentrate too much on the maneuver and not enough on what your opponent is doing. Also, many maneuvers slow the aircraft, and a slow airplane is a sitting duck. Even if you know your opponent isn't in a shooting position, it's still dangerous to slow down.

The Half Roll

Yeates described this as the "only stunt useful in fighting"; in World War II this stunt became known as the "Split S." The stunt is useful for shaking someone off your tail. To perform it, roll the aircraft on its back and then pull back on the stick.

The Loop

This maneuver is seldom used in combat. It involves simply pulling back on the stick and keeping it there. The aircraft will climb and, at the top of the maneuver, it will invert and face the opposite direction. Keep pulling back on the stick and the aircraft will begin a dive. Eventually it will be right-side-up and flying on its original heading. A loop is best entered from a slight dive and with relatively high speed. In the stationary-engine aircraft, this maneuver is straightforward; in the rotary-engine aircraft, you'll need plenty of left rudder at the top of the maneuver while inverted.

In both types of aircraft you must "feel" how much to pull back on the stick. Too much or too little will result in a stall and possible spin.

The Break

The break is basically a hard turn to port (left) or starboard (right) accomplished by rolling the aircraft at about 90 degrees and pulling back on the stick to tighten the turn.

In mastering the break in any direction, you master the repositioning of your aircraft in space relative to your friends and foes. The change in one plane of motion may be significantly less than its counterpart, but the two will always change in a turn. A turn can combine a vertical and horizontal plane change in equal parts to significantly alter your aircraft's position in space. A diving break to starboard is a good example.

If you're coming into your break too slow, try slamming on full rudder to the side you're turning toward. The rudders will initiate the turn and roll without creating too much drag.

The Immelmann

This maneuver is used to reverse your direction. There are two versions. In the first, pull back on the stick and keep it back, as if you were going to do a loop. When your aircraft is inverted and facing in the direction opposite to which it commenced the maneuver, roll the aircraft the right way up. This is, in effect, the half-roll in reverse. Although it has the advantage of gaining height while reversing direction, use it with circumspection in combat; the aircraft is slow and vulnerable near the top of the maneuver.

There are many variations of the second version of this maneuver. In its purest acrobatic form it becomes the Hammerhead. However, this is no good in combat because it involves going very slowly at the top of the climb. In fact, the combat maneuver is more like a wingover: Pull back on the stick and immediately apply rudder and aileron in the same direction. It's possible to stall the lower wing intentionally to increase the roll rate. On rotary-engine aircraft, the pull back will create a yaw to the right, which will make right turns faster.

Dive and Zoom

This maneuver consists of diving down on your opponent and opening fire at about 150 m. When range is about 50 m, stop firing and pull out of the dive. As you fly over your opponent, he could pull up sharply and get some shots off at you. To avoid this, apply a little roll when pulling out of the dive. At the end of this maneuver you should have regained your height advantage over your opponent.

Dive and zoom tactics suit stationary-engine aircraft. These have a high performance level and can outclimb the lower-powered rotary-engine aircraft. However, rotary-engine aircraft are better in turning flights.

General Tactics

> *Always above, seldom on the same level, never underneath.*
> —Mannock

The function of aerial tactics is to gain an advantage, and the good patrol leader will never attack without an advantage. Many factors to consider when assessing advantages are just as important today as they were in World War I. Maintaining the element of surprise probably always will be the most significant factor. The patrol leader should also consider firepower, aircraft performance, pilot skill, and numerical advantage. A height advantage, however, is no longer as important now as it was then. During the Great War, aircraft had little excess power, and gaining height took a long time. In World War I, the pilot of the higher aircraft often had the luxury of being able to choose whether he should enter the fray or simply disengage. We can paraphrase Mannock's simple instruction—never attack without an advantage.

By 1917, the skill and ability of the patrol leader largely dictated success or failure in air combat. Success had to do with choosing the time to fight rather than being good at fighting.

"The commanding officer is responsible that neither he nor any of his pilots are surprised by the enemy. If he cannot see to that, he is no good as a leader" (the Red Baron).

In general, tactics break down into two areas—those of the patrol leader as he approaches the enemy to gain an edge for a forthcoming dogfight, and those of the individual during the dogfight. Clearly, if the patrol leader has done his job well, there will be no dogfight. The enemy will be surprised and destroyed before he can react.

"The best way to shoot down an enemy aircraft was to surprise him and get as close as possible before opening fire" (Rochford).

Fighter pilots in WWI had no previous experience to draw on to guide them in air combat, and so had to devise their own best methods for attack and defense. The earliest example of a set of rules for air combat was the "Dicta Boelcke." These were drawn up by Oswald Boelcke, Germany's leading air ace at the time and the guiding force behind the formation of the fighter Jasta (squadron) in 1916. Although he was killed later that year, the Jastas followed his principles and decimated the Royal Flying Corps during Bloody April, 1917.

As the war progressed, air combat became more complex, and solo patrols became a thing of the past. Flying in formation and teamwork became more important.

"German air strategy was intended to be scientific; they were unwilling to attack except from a winning position derived from the advantages of height, surprise, and numerical superiority, and they did not hesitate to avoid or run away from combat when these factors were not in their favour. They also avoided crossing the lines, to have the further advantage of fighting above their own terrain. They were also adopting the idea of large circuses, flying in layers, and when you attacked one of the layers, it melted away while pilots above dived toward you" (Yeates).

Mannock's Rules

Pilots must dive to the attack with zest, and must hold their fire until they get within one hundred yards of their target.

Achieve surprise by approaching from the East (i.e., from the German side of the lines).

Utilize the sun's glare and clouds to achieve surprise.

Pilots must keep physically fit by exercise and the moderate use of stimulants.

Pilots must sight their guns and practice as much as possible as targets are normally fleeting.

Pilots must practice spotting machines in the air and recognizing them at long range, and every airplane is to be treated as an enemy until it is certain it is not.

Pilots must learn where the enemy's blind spots are.

Scouts must be attacked from above and 2 seaters from beneath their tails.

Pilots must practice quick turns, as this maneuver is more used than any other in flight.

Formation flying at 25 yards apart must be practiced.

Pilots must practice judging distances in the air as these are very deceptive.

Decoys must be guarded against— a single enemy is often a decoy – therefore the air above should be searched before attacking.

If the day is sunny, machines should be turned with as little bank as possible, otherwise the sun glistening on the wings will give away their presence at a long range.

Pilots must keep turning in a dogfight and never fly straight except when firing.

Pilots must never, under any circumstances, dive away from an enemy, as he gives his opponent a non-deflection shot— bullets are faster than airplanes.

Pilots must keep their eye on their watches during patrols, and on the direction and strength of the wind.

Fighting tactics varied with circumstances; there were rarely two identical situations....Consequently adjustment of tactics had to be made to suit the occasion. However, the main principle remained the same: the enemy must be surprised and attacked at a disadvantage, if possible with superior numbers so the initiative was with the patrol. To achieve this objective, it was sometimes necessary to spend over half the time of the patrol maneuvering the enemy formation into an unfavorable position. Having got it there, pilots must dive to the attack with zest....The combat must continue until the enemy has admitted his inferiority, by being shot down or running away.—Mannock

Formations

Formation flying was our great forte, our compactness and drill often intimidating superior formations.—Fullard

World War I aircraft didn't carry radios, and apart from some very basic signals, such as flares and wing waggling, communication in the air was impossible.

Therefore, your pilots must be briefed, instructions issued, and the formation to be flown determined before your patrol leaves the ground. In some cases, mission requirements and pilot and aircraft availability will dictate formation.

Rapid aircraft and pilot identification is vital in a dogfight, so aircraft should be clearly marked. This is especially true of the leader's aircraft.

The Approach

> *The great thing is to see things....Many a fresh pilot is shot down before he even knows there is a Hun within miles....Practice looking around you so that you study every square foot of the earth and sky every two minutes. Watch the region of the sun especially.*—Yeates

It's estimated that 80 percent of fighterpilots shot down never saw what hit them. Spotting the enemy before he spots you is crucial to becoming a successful air-fighter.

"Whenever you're over the lines, you must keep twisting your neck in all directions every minute, or you're sure to be surprised" (the Red Baron).

The very best WWI pilots could glimpse an enemy aircraft at about five miles. Most pilots could pick out a target at around half of this distance. In *Red Baron II*, the range at which there is a reasonable chance of spotting is about three miles. When you spot aircraft, the first thing to do is determine who and what they are. The leader must fix their position, maneuver his flight to gain an advantage, and gain more information.

The situation is complicated by the German system of firing close to their own aircraft to warn of possible attack (although these tended to be individual shells rather than full barrages). Nevertheless, if a machine is over friendly lines and it's being fired at, it's reasonable to assume that it's hostile fire.

In the absence of archie, the following information can sometimes be deduced from the numbers and actions of unidentified aircraft:

- A formation of six or more machines, flying on no definite course = an offensive patrol of fighters.
- A single machine low down, flying a regular oblong course = a two-seat artillery observation machine.

- A single machine low down, flying a very irregular course = a fighter attacking ground targets.
- A single machine, flying very high on a straight course = a long-distance reconnaissance mission.
- A formation of six or more machines, flying at medium altitude and two or three below them flying a nearly straight course = a photographic patrol with escort.
- Two large formations, one above the other, flying on a straight course = a bombing mission with escort.

Depending on the aircraft's' position relative to the front lines, it may be clear whether they're hostile. The patrol leader should also be aware that fighters often fly in stacked formations, so, having spotted one layer, you should check above and below for more. Similarly, if a small group of aircraft is behaving rather recklessly, they could well be bait, with a large group of friends above them ready to discourage ill-considered attacks. Or they could be part of a large fighter formation out looking for trouble.

In approaching unidentified aircraft, patrol leaders should follow Mannock's advice and approach from an unexpected direction, ideally using the sun and cloud cover to advantage. If in doubt, climb! The patrol leader should constantly think ahead, planning his attack and watching for more aircraft.

During approach, observe your target continually. If it starts to climb or maneuver, assume that it's hostile and experienced; if it carries on undisturbed, it's either friendly or unaware; if it dives for home, you may attack with impunity—unless it's bait.

The leader is the patrol's strike force. All other aircraft are concerned with keeping a lookout. This rule should apply no matter how many aircraft are in patrol. When the enemy is spotted, the patrol leader must decide whether to attack, maneuver, or disengage.

If the patrol is being stalked, a decision must be made whether to attack, maneuver, or disengage. The relative abilities of the machines involved, or the

patrol's mission, may well determine this. If the patrol's aircraft are superior, they can maneuver and attempt to turn the tables. If inferior, a swift decision must be made whether to immediately attack, which may be enough to scare the attacker off, or to disengage (ideally, by climbing toward friendly lines).

Attack

Once in position the attack is commenced. The purpose of the first attack is to destroy or scatter as many of the enemy as possible, to minimize the effects of a counterattack.

Against enemy fighters, the ideal attack will have been launched from above and behind. The leader will commence firing at his target at between 100 and 200 yards, and keep firing until collision is imminent.

Opinion was divided on whether it was better for all pilots to concentrate on a single enemy or each to engage an individual target. It was important to try and eliminate the enemy leader on the first attack. The more targets engaged, the more casualties inflicted and the greater the confusion. And many pilots converging on a single enemy tended to worry more about colliding with friends than pushing the attack to its limits. They had reason: There were far more collisions in World War I air combat than in later conflicts. Mannock and Richthofen were both of the view that it wasn't worth ganging up on a single target.

After attacking, a decision must be made whether to stay and dogfight, entering a turning engagement with the enemy, or to pull out in a zoom climb. Dive-and-zoom tactics are generally safer for the attacker, especially if he turns as he zooms, because he gains separation from the enemy, minimizing the chance of counterattack while preserving a height advantage, and allowing him to attack again or disengage. The types of machines engaged may influence this decision. Rotary-engine scouts on the attack may prefer to stay and enter a turning contest with a high-performance enemy.

If you're leading a smaller formation against a larger one, or even flying alone, it's important that your first attack inflict considerable damage and confusion. Take care to ensure there's a safe retreat route. This could be a

zoom climb to safety, or the speed built up in a diving attack. If the smaller formation can't launch an attack with these advantages, reconsider your decision to engage.

Finally, a lone pilot could launch a stealthy attack, ideally from behind or below (although surrendering the advantage of height isn't normally recommended). The object of such an attack is to pick off the rearmost enemy—hopefully without the other enemy pilots noticing. Contemplate a lone attack only if your aircraft has a significant speed or climb advantage, or you're supremely confident in your abilities.

The Dogfight

When two patrols meet, and neither has a positional advantage, a dogfight develops rather rapidly.

When one formation surprises another, a dogfight will form after the initial shock has worn off. Formations tend to break up into a series of one-on-one engagements with pilots desperately trying to find a target while avoiding becoming one. In such confused aerial melees, teamwork and leadership still play vital roles. A patrol should fight as a team, with pilots looking to protect each other's tails, and the leader ensuring he remains aware of the general course of the battle.

Dogfighting is perhaps the single most exciting element of *Red Baron II*—and the most difficult to master. If there's one key to victory, it must be patience. Patience truly is a virtue behind the trigger of a machine gun. A skilled pilot plans his aircraft's next move the way a grand master plans a move in chess. Analyze the enemy aircraft's behavior and motion, determine what it's most likely to do, and maneuver your aircraft to intercept. Firing wildly gets you nowhere. A pilot who stays on top of the trigger, blasting off rounds like there's no tomorrow only winds up with an empty click and a sitting duck for a plane. Learn to be cool, calm, and collected, and press that trigger only when a hit seems likely. Don't become hell-bent on performing daring acrobatic maneuvers at the cost of speed and altitude; this is exactly what your enemy wants.

Figure 4-4
Two warriors meet in the air.

The Offensive Mind-Set

> *The main point is to make tighter turns and to stay above the opponent.*—the Red Baron

> *I fly close to my man, aim well, and then of course he falls down.*
> —Boelcke

In a nutshell, this is what offensive tactics are all about—keeping the advantage, maneuvering to within 100 yards of the enemy, and getting in position (ideally directly behind) to deliver the decisive burst. There are, however, a few more tricks that may benefit budding aces.

First, fight according to *your* strengths, not the enemy's. If you're in a high-performance stationary-engine scout, it's sheer folly to try and enter a turning contest on equal terms with a nimble rotary-engine enemy.

Second, because most pilots find it easier to turn left, consider attacking from the right.

Third, sometimes you can panic an opponent into adopting foolish tactics. If it looks as if an enemy is outdistancing you, a few long-range bursts may distract him and encourage him to start weaving. This will slow him and allow you to get within effective range. Richthofen used this trick on more than one occasion. Stark found himself up against a Camel that continually evaded him by turning. He fired a quick burst that so startled the Camel pilot he came out of his turn and flew straight, presenting an easy target.

The key things to remember in a dogfight are to keep the initiative, make the enemy react to you, try to stay above your opponent, and always fly with a cool head.

Fourth, constantly monitor what's going on around you. In a dogfight there are often no second chances, and one of the biggest mistakes you can make is to lose awareness of what else is going on and where the other enemy machines are.

"It is well...never to stay long after one machine" (Bishop). Yet, as Mannock said, every flight is different; there are no universal rules to success in the air, only guides. You must adapt established tactics to suit the situation, and sometimes ignore them completely.

Defensive Mind-Set

If you're attacked, do something, *anything*, to put the enemy off his aim. Many raw pilots of this era simply froze and were shot down easily. Clearly, some defensive maneuvers are better than others, and the defender must decide quickly whether he wishes to evade the attack or turn defense into offense.

When you're under attack from the rear, the best defensive tactic is to turn toward the attacker. If the attack comes from the left, perform a hard turn. If it comes directly from behind, turn in either direction, but consider the relative performance of the various aircraft: If you're flying a rotary, a right turn is probably best; if you're in a stationary-engine scout against a rotary, opt for turning left.

With the defensive turn, timing is critical. Too soon and the attacker has time to adjust smoothly and keep you in his sights. Too late and you present him with a simple close-range shot. If possible, climb as you turn. This way you may be able to turn the tables on your attacker.

As an alternative to the turn, 56 Squadron advised new pilots, "If the enemy fire is too hot, hard rudder and no bank— sideslip!" Richthofen was against such a maneuver, possibly because it limited chances of gaining the initiative and turning defense into attack.

Clearly, you can combine these moves; many Camel pilots found the best way to throw an enemy off his aim was a hard turn with a sideslip, making any shot at their aircraft almost impossible. German pilots could do much the same with the triplane; Voss used these tactics against McCudden, turning defense into attack.

A sudden zoom is another useful ploy, but this works best if you're attacked by a single enemy who's very close; the aim is to make him overshoot. You can combine this with a roll to further reduce speed and maybe change direction, or carry it on into a loop or Immelmann. Much depends on the relative speeds and performance of the aircraft involved. A poorly judged zoom is almost invariably fatal: The defender is left at very low speed, offering an easy shot. McCudden describes the results of a zoom-and-turn contest where the inferior machine initiated the maneuver: "Zoomed, the SE just went a little higher, then we both turned inwards and the Hun losing height, I at once did a quicker turn and got behind him." Most pilots thought the loop was a waste of time in combat. Mannock said a zoom followed by a turn was far better.

A roll may also force an attacker to overshoot. Although presenting a difficult target, it has much the same disadvantages as the zoom, and was especially dangerous against multiple enemies. Most pilots advised against this ploy.

If a pilot simply wanted to escape, a spin would sometimes be induced. This made the aircraft a very difficult target and might trick an attacker into thinking he'd gotten in a fatal burst. But this maneuver involved losing a great deal of height, and if the attacker followed the defender down, he had an easy

shot when his target pulled out of the spin. Most aces recommended against this ploy, but most also used it at least once to escape during their career.

All pilots were instructed not to dive away when attacked. Even fast-diving aircraft, such as the Spad and SE5a, couldn't outrun bullets. The straight dive away presents the enemy with an easy shot. If you're in a fast machine and wish to disengage, throw the attacker's aim off or get out of the field of fire before commencing a dive to safety.

Attacking Two-Seaters

Two-seaters, with their lower performance, were often regarded as easy victims, especially the poorly built British aircraft, such as the BE2 and RE8.

"If you sat properly under its tailplane, the Hun couldn't touch you. Of course, you had to keep there and that was a matter of flying, and a scout ought always to outfly a two-seater" (McCudden).

But a two-seater with an observer manning the rear gun was much harder to surprise than a fighter and could fire both forward and backward. The approved method for attacking these machines was, as McCudden said, to fire from a position about 100 yards behind and 20 yards below. RAF instructions also advised that a short vertical dive directly onto the two-seater could work; this would present the observer with a difficult shot. Richthofen suggested, "One attacks the two-seater from behind at great speed....The only way to avoid the adroit observer's machine gun fire is to stay calm and put the observer out of action with the first shots."

But a well-handled two-seater could make lone attacks difficult and dangerous, and several aces were killed attacking such so-called "easy victims."

The standard defense of a two-seater under attack was either to dive for home, in hopes of preventing attackers from getting in the observer's blind spot under the tail, or to turn and lose height at as slow a speed as possible, forcing the attacker to overshoot or pull out to where the observer could have a clear shot.

Shooting

Nearly all the great aces emphasized that the most important skill in aerial combat was accurate shooting. Yet, apart from a few natural shots, most World War I pilots found hitting the target in a dogfight very difficult, indeed. As with every other facet of this new war in the air, successful aerial gunnery required both practice and experience.

Pilots were handicapped by their weapons. Machine guns often froze at high altitudes and there was always the risk of them jamming, especially during a long burst. Most aces spent hours on the ground checking their guns and loading the ammunition themselves to minimize chances for malfunction at crucial moments.

Aircraft on both sides carried about 500 rounds of ammunition per gun, enough for about 50 seconds of firing. German scouts could carry more, but most pilots preferred not to, to save weight. The ammunition load normally comprised a variety of rounds. The Germans tended to have a mix of standard ball, armor-piercing, and phosphors. This was fine for short ranges—50 yards or closer—but added to the inaccuracy of long-range fire due to the different ballistic properties of the assorted rounds. According to an RAF pamphlet, the cone of fire from an aerial machine gun was 10 feet by 15 feet at 200 yards, and inaccuracy made a destructive burst of long-range fire unlikely.

Given unreliable weapons and primitive sights, pilots, ideally, wished to be directly behind and within 30 yards of an enemy to have a reasonable chance of hitting and destroying him with a short burst. Short bursts were important to minimize chances of a jam. Successful fire from outside this envelope was beyond most pilots. This was why the objective of every patrol leader was to attack with surprise—to give his pilots the benefit of the simplest shot possible.

However, determined pilots could work out rudimentary methods of hitting targets that were in less than ideal positions. For deflection shooting, Mannock advised his pilots to sight about five yards in front of the

target's engine, fire, and while firing, bring the stick back as far as the enemy pilot and push it forward again. Mastering this skill will give you a huge advantage.

Attacking Balloons

Due to the preponderance of archie (antiaircraft guns) around a balloon position, attacks on these targets normally were cordially disliked by most pilots, although there were specialists, such as Coppens, who shot down 36. The preferred method was the fast, steep dive. The diving attack allowed the assailant either to zoom to safety above the archie or to streak toward the sanctuary of the front lines at a low level and high speed; either tactic minimized exposure to hostile fire.

However, a sneak attack also was used, often by a lone aircraft. This involved approaching the target at a low level from an unexpected direction. Regardless of method, the attacker inevitably must get close to his target before bringing it down.

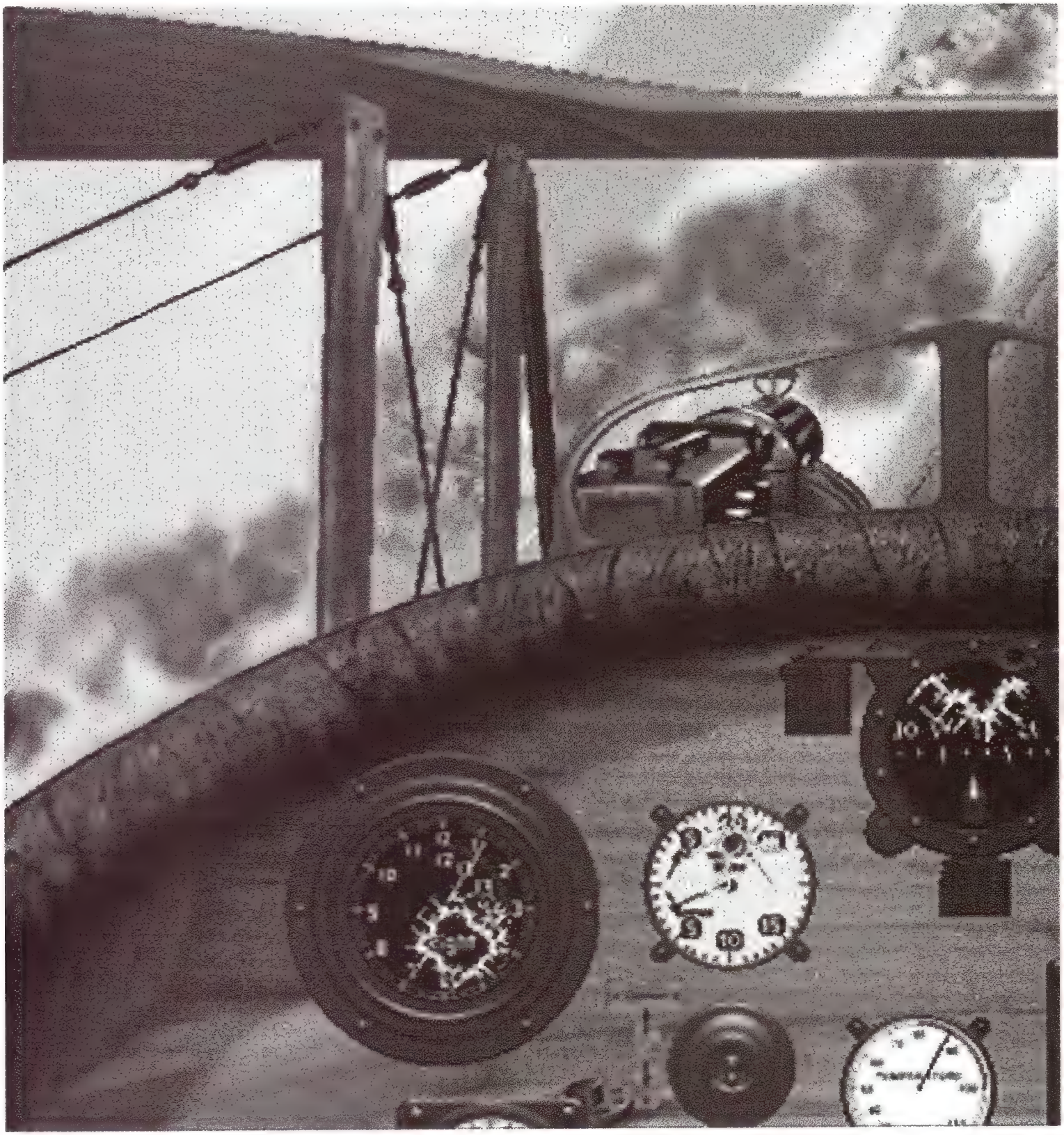
Ground Attack

Although some pilots enjoyed this work, most hated it, feeling that no matter how good or lucky you were, sooner or later ground fire would get you. Attacks normally were made in pairs. Camels tended to attack the same target simultaneously, converging on it from different directions.

Archie

Antiaircraft fire wasn't a great menace to fighters unless they were damaged, flying under 1,000 feet, or there were a large number of guns. Nevertheless, being under fire from archie was a strain on a patrol and could distract a pilot at a critical moment. And there was always the chance of a lucky hit.

Archie was useful for more than knocking down aircraft. Merely firing at a formation instilled confusion and stress, and set a squadron up for a possible dogfight under difficult circumstances. One way to avoid getting hit is simply to sway your airplane back and forth. Take care, however, if you're flying in formation. You don't want to slam into a friend!



5

The Great War

The Flyer

It was called the *Flyer*. It sat there on a wooden rail. A light wind blew across the dunes of Kitty Hawk. Orville Wright, a humble bicycle builder, lay prone on the lower wing. His brother, Wilbur, gripped the wing's right tip to balance it. A tiny, home-built engine connected by bicycle chains to two propellers erupted to life.

The tether was unfastened, and the *Flyer* ambled forward as Wilbur jogged beside. Within seconds, the *Flyer* lifted from the ground, cruised to an altitude of 10 feet, and flew at an airspeed of 30 miles per hour for 12 continuous seconds. One hundred twenty feet later, the *Flyer* touched the ground and came to a historical rest.

The brothers traded off after that, one flight after another with tweaks to the engine and weight balances sending the *Flyer* farther and farther with each attempt. The last flight of the day found the *Flyer* under complete control, cutting through strong gusts of wind, for an amazing 59 seconds and 852 feet.

The date was December 17, 1903. No one could have conceived what would happen inside 10 short years. This remarkable invention of flight, a feat attempted without success by scores of engineers and tinkerers before the Wright Brothers, would become a new instrument of war, inflicting scores of casualties across the globe.

Amazingly, this important day passed with little fanfare and, for the most part, went unreported. A handful of local newspapers ran the story, but most readers refused to believe the reports.

But the Wright Brothers had a personal vision. Undeterred by lack of public interest, they continued refining their creation. It wasn't until *Flyer 3*, a plane that flew 24 miles in 38 minutes, that heads began to turn. Governments from around the world dispatched military representatives to examine these improbable flying machines, but the Wright Brothers sent them away, hoping to offer their work to America first. Unfortunately, the U.S. Army laughed at the Wright Brothers on two occasions, labeling them just another couple of crazy scientists angling for government funds.

Upset, and running out of money to continue their work, the Wright Brothers shut down their operation for nearly two years.

By then, word had gotten out to other inventors around the world. A flurry of work was underway, all based on the Wright Brothers' initial experiments. This activity inspired the Wright Brothers to get back to work lest they be robbed of their due glory. It wasn't until their fourth appeal to the U.S. government, thanks in part to President Theodore Roosevelt's support, that the U.S. Army acquiesced. Orville quickly departed to Ft. Meyer to present a demonstration, and Wilbur was off to Le Mans, France to start a company that would sell planes commercially. The year was 1908.

Aviation developed exponentially after these initial demonstrations. Europeans were quick to embrace the new technology. The following year Wilbur established a flight school in Pau, France, followed by schools in Germany and Italy.

The year 1909 saw many advancements, and not all by the Wrights. Louis Bleriot flew his Type XI monoplane across the English Channel. The first international air races began at Rheims, France where Henri Farman set a new distance record of 112 miles. Hubert Latham attained a new altitude record of 508 feet. Glenn Curtiss set a new speed record of 48 miles per hour.

All these events ultimately served to excite the military. After Orville Wright's successful flight of 10 miles at a sustained speed of 42 mph, carrying an exhilarated Lt. Benjamin Foulois, the U.S. War Department purchased its first military aircraft on August 2, 1909.

There was no turning back. Airplane mania spread across America and Europe. The first truly successful plane was designed by Igo Etrich, an Austrian. His 1910 design, the Dove, was soon produced in large quantities by an enthusiastic German government. Russia soon followed with the Grand, a large, multiengine aircraft that carried 16 passengers.

The military soon incorporated airplanes into their strategies, primarily as reconnaissance. Pilots could see over vast distances and monitor ground activity from military aircraft. Pilots on both continents experimented with arming their planes prior to the outbreak of the Great War. Major Jacob Fickle

of the U.S. Army fired the first shot from the seat of a Curtiss biplane using nothing more than a Springfield rifle.

Commander Cleland Davis of the U.S. Navy created a more realistic airborne weapon that propelled a counterweight from a tube while firing its shell through the barrel. In June 1912, Lt. Col. Isaac N. , of the U.S. Army presented his light machine gun design at the aircraft testing field in College Park, Maryland. The gun was placed on a Wright Model B and managed to shoot a ground target from a height of nearly 250 feet.

Back in Britain, the Royal Flying Corps fired a heavy machine gun from Geoffrey De Havilland's prototype for the F.E.2 (Fighter Experimental Number 2). The following year a 1-½ pound Vickers cannon was fitted to the nose of the plane for potential antizeppelin work. After further experiments, the first "fighting biplane"—the Vickers F.B.5—was put into serious production.

By 1914, Europe was gearing up for war—and its pilots hoped to play an important role.

The Great War

Never before had warriors gone to battle with support from the air. Unfortunately, the technology was so new that no one had quite figured out how best to utilize this new strategic element.

No flyer was killed until the second week of the Great War—August 12, 1914. Oberleutnant Reinhold Janow plummeted from the skies when his Dove was hit by rifle fire from the ground. It's possible Janow was hit by friendly fire. At this point in the war, there was no such thing as markings or plane insignias, so ground troops simply shot at anything and everything that flew overhead.

The air forces of all the warring nations mobilized quickly to scout for their respective country. Germany put out a call for 230 aircraft for active service in their armada of 33 squadrons. France had plans to send forth 162 aircraft spread over 23 squadrons, but only 136 planes and 6 dirigibles were serviceable when war broke out. Russia put up 244 aircraft, and the Royal

Flying Corps mustered 179. America, the homeland of aviation, only managed to construct 23 aircraft. (The U.S. wasn't involved in the war at this point, and didn't enter the fray until mid-1917, years after everyone else.) Though all these numbers are small, they quickly grew as the importance of aerial combat become apparent.

Though thousands were dying on the battlefields in the first few days of the war, the skies remained a relatively peaceful place. If two foes happened to meet in the skies, they'd simply circle one another, determine nationality, and usually greet one another with a friendly wave, breaking off and returning to work.

It didn't take long before airborne missions took on a more warlike aspect. The voluminous bloodshed spreading across the landscape was instilling the aviators with a desire for revenge. At first they simply carried pistols and rifles, but these proved useless against a hard-turning foe. A determined Louis Strange of the Royal Flying Corps felt a machine gun was in order, so he mounted a Lewis to the front of his pusher biplane. Unfortunately, the gun proved so heavy it reduced his altitude by half, forcing his commander to remove it. Meanwhile, the German High Command declared that attempts to place machine guns on planes were wastes of time.

Then French aircraft designer Gabriel Voisin strapped a Hotchkiss light machine gun on an Escadrille V.24. His twist was in mounting the machine gun on a pivoting fork over the front cockpit. It proved its worth when, on October 5, 1915 Sgt. Joseph Frantz, with observer Cpl. Louis Quenault, engaged a German Aviatik over the front in an armed Voisin. When machine-gun bullets began zipping by the German pilot's head he quickly turned away, shocked. The French pursued, devising tactical combat on the fly, and sent the German spiraling downward, the first victim of aerial combat.

As for bombs, there was still little advancement in this area. Most pilots simply lugged artillery shells into their planes, attaching crude fins to prevent tumbling. The French were slightly more aggressive, using the same method but with 90 mm shells. These bombs were strapped to a belt around the pilot's waist and dropped by hand.

The first few months of the war were very illuminating. Aviation quickly won the support and respect of the traditional military, and was finally receiving the support it needed to grow. Each nation issued a demand for better performance.

Evolution

The French led the way. In October, Gen. Joffre placed Commandant Joseph Bares in charge of French aviation. Flying schools were promptly closed to provide the people on the front with the schools' materials; factories were stripped of workers to focus the labor force on creating squadrons of aircraft. In one fell swoop, Bares wiped out the results of his predecessors' shortsightedness. He quickly doubled the existing air force to more than 60 squadrons. Then he customized these squadrons for specific functions. Thirty squadrons of six planes each were earmarked to corps-level reconnaissance and artillery cooperation. Sixteen squadrons would remain in reserve under army control for purposes of pursuit. Another 16 squadrons were devoted to bombardment and placed under the command of the GQC (French General Headquarters).

Bares' schematic focused on only four types of service aircraft. The Caudron G3, a biplane with a central nacelle containing an 80 hp Le Rhone rotary engine, was selected for artillery ranging and observation. For general reconnaissance, the Maurice Farman MF VII "Longhorn" pusher, powered by an 80 hp Renault engine, was selected. The Voison LA 5, a pusher biplane powered by a 130 hp Salmson, was earmarked for bombing. For pursuit, the fast and nimble Morane-Saulnier Type L parasol monoplane outfitted with an 80 hp Le Rhone engine was chosen. All remaining aircraft types were promptly removed from service and used to train pilots.

The Implementation of National Insignia

At the outset of the Great War, planes came down in droves, largely due to the scourge of friendly fire. Airplanes had no recognizable markings, making it

near impossible for ground troops to distinguish a friendly plane from an enemy. Before long, the French and Germans arrived at the concept of national insignia and put it in motion; the remaining countries soon followed.

The French used a symbol modeled after the round emblem of the French Revolution—a French flag wrapped about itself (a blue center surrounded by a white inner ring and a red outer ring). These symbols were placed at the tops and bottoms of airplane wings and at the sides of the fuselage. The rudder was painted like the national flag, with vertical bands of blue, white, and red.

The British applied their national marking—the Union Jack—to the undersides of the lower wings of all commissioned aircraft. Unfortunately, the large, dark crosses of the British flag resembled the German Maltese Cross when viewed at a great height. By November, they'd adopted a rounded emblem, much like the French insignia, but with red at the center, white around it, and a blue outer ring.

When the U.S. entered the conflict in 1917, it adopted a white star insignia with a disc of red at the center, against a blue field.

The Germans immediately adopted the Maltese, or Iron, Cross, in black on a white background square. They applied this pattern to the tops and bottoms of aircraft wings, to the sides of the fuselage, and to the rudder.

Invisible Planes

At first, planes were constructed with little thought to camouflage or color scheme. They came off the assembly line sporting civilian colors. Most planes were simply off-white, due in part to the clear shellacking of aircraft dope that allowed the plane fabric to remain taut and strong.

By mid-1916 it was apparent that aircraft needed some form of protection against observation by enemy planes. The British began by painting the upper surfaces of wings and fuselages olive green. This dark color helped conceal the aircraft against the landscape when viewed from above; the light color of its underside prevented easy recognition from below. The Germans painted the upper surfaces of their planes in alternating fields of green and mauve.

The French pattern of camouflage was perhaps the most defining of the war. Irregular patches and curved shapes of earth-tone colors covered all sides and upper surfaces of the plane; the underbelly was painted a solid blue.

All this paint was detrimental to the plane's performance, and soon manufactures abandoned paint in favor of printed fabric.

Who Was That?

A unit's insignia has always been a part of the military. But given the new complexity of combat in the skies, where many squadrons were thrown together, clear unit identification soon became mandatory.

Again, the French were the first to implement this. The elite fighter squadron in the Groupe Brocard sported flying storks, while the Lafayette Escadrille of American volunteers displayed the face of a Native American.

The Royal Flying Corps attempted to standardize their unit marking with geometric shapes on the fuselage. They used white triangles, straight or slanted stripes, dumbbells, boomerangs, and hexagons.

The Germans concocted the most colorful insignias for their fighter groups, affectionately called "circuses" by Allied pilots. The first circus, the Red Baron's JG 1, used black-and-white checkerboards on the planes of Jasta 3, snake patterns on those of Jasta 4, yellow fuselages for Jasta 10, and red for Jasta 11.

Getting Personal

Personal markings helped identify members within a flight or squadron. The British used letters, the French and Americans, numerals. Germans displayed personal emblems or colors. Flight leaders attached colored streamers to their struts. Several Allied flight leaders painted diagonal stripes on their upper wings to better illustrate their leadership rank. Rickenbacker's Spad had red-white-blue slants on the wing, Brown's Camel had a wide, red chevron, and Ernst Udet went crazy with a red-and-white candystriped upper wing on his Fokker D VII.

Soon, pilots made things even more personal. Charles Nungesser, repeatedly wounded in battle, adorned his plane with a skull, crossbones, coffin, and candlesticks, all painted against a black heart. George von Hantelmann also displayed the skull and crossbones on his Fokker D VII. The German ace Werner Voss painted hearts and swastikas on all his planes.

As pilots became familiar with their planes, they became obsessed with such personal aircraft markings. Rudolph Stark, commander of the Bavarian Jasta 35, once said, "We land and put our treasures in the hangars. The painter marks them with the Staffel badge, the arrowhead on the wings, then paints the fuselage with the colored bands that identify the individual pilots. He takes particular care with my machine, embellishing my lilac stripe with narrow black edges. Only then do the machines really belong to us."

Improvements

By 1915, many aircraft were carrying machine guns to harass the enemy, but victories were still rare. Most planes were simply too slow to follow an enemy, making attempts at engagement all but futile.

It would take more experimentation to further this goal. Lieutenant Louis Strange of No. 1 Squadron RFC mounted a Lewis machine gun on his single-seat Martinsyde S.1 Scout so it fired over the top of the spinning propeller. The French pushed their organization and technical know-how to new heights, crafting a speedy Morane-Saulnier and researching machine-gun "synchronization": Not true synchronization, the device consisted of special deflector wedges attached to the propeller to prevent the bullets from breaking the blades.

Roland Garros made history when, on April 1, 1915 he flew toward Ostend, came up behind a lone German two-seater, and blasted it with machine-gun fire, killing both men aboard. Two weeks later, Garros claimed two more victories and was immediately propped up as a hero of the French. In fact, it was the French who bestowed on Garros the title "Ace," meaning anything outstanding. The name "Ace" caught on and any pilot who managed to collect five air victories also was so honored.

However, Garros was shot down over German territory in 1915, placing his airplane and his designs in the hands of the German government. Anthony Fokker, a Hollander who built Morane spin-offs, examined Garros's device and quickly set to work improving it. In just 24 hours, Fokker had created a mechanical synchronization apparatus that prevented the machine gun from firing whenever the propeller blade passed before the barrel. He then traveled to the front to prove its effectiveness.

After many weeks of alterations and improvements, Oswald Boelcke and Max Immelmann received the new and improved Fokker Eindecker. On August 1, Immelmann scored his first victory by shooting down a British RAF B.E.2c above the city of Douai. Boelcke scored the next victory, and it wasn't long before both exceptional pilots were mopping the skies clean of enemies. By the time October came to a close, both could boast eight victories, and both received the coveted Blue Max award for valor.

The Fokkers had a devastating effect on the opposition. By 1915, the Allies were frantically trying to keep up with German advances. They became demoralized as their losses mounted. The brutal combination of Fokker E I monoplanes and the Type C two-seater spread terror across the skies. The Allied armies pressed the panic button. Strategic bombing came to a grinding halt. On one mission, Fokker Eindeckers shot down six French bombers. The Allies sent aloft new squadrons of machine-gun–equipped aircraft to deal with the "Fokker Scourge."

By 1915, the world's air forces were moving at maximum speed.

German Aircraft Designations

Aircraft designs were suddenly coming in so many types and variations, the world's militaries needed a way to keep track of them all. The Germans had placed their aircraft in only two categories, Type A (monoplanes) and Type B (biplanes). These categories expanded as the war intensified. (The numbers following the category reflect a military designation for a given model.)

German Category Codes

Code	Description
A	Single-engine, unarmed monoplane
B	Single-engine, unarmed biplane
C	Single-engine, armed two-seater
CL	Light single-engine, armed two-seater
D	Doppledeckers—single-engine, armed, single-seat biplane
E	Eindeckers—single-engine, armed, single-seat monoplane
F	Triplane fighters (replaced by the "Dr" designation)
Dr	Dreideckers—single-engine, armed, single-seat triplane
G	Grossflugzeug—twin-engine, armed, multiseat biplane
J	Infantry Airplane—armored and armed two-seat biplane
N	Night Bomber—types similar to G and R classes
R	Riesenflugzeug—mammoth multiengine, multiseat long-range bomber
S	Ground Strafing—types similar to J class
W	Wasserflugzeug—seaplanes and flying boats

French Aircraft Designations

The French categorized their aircraft according to function. These designations recorded the manufacturer, model number, intended use, and the number of crew required.

French Category Codes

Code	Description
A	Corps d'Armee: army cooperation, artillery spotting, and photo-reconnaissance
Ap	Long-range, high-speed photo-reconnaissance scout
B	Bombardment—bombing aircraft
Bn	Bombardment Nuit—night-bombing aircraft
C	Chasse—pursuit and fighter aircraft
Ca	Canon—aircraft whose main armament is a 37 mm gun
E	Ecolle—training aircraft
H	Hydroavion—float planes and flying boats
S	Sante—medical transport

British Aircraft Designations

The British had their own way of doing things when it came to classifying their aircraft. It was simple, and to the point.

British Category Codes

Code	Description
B.E.	British Experimental—pre-war biplanes
F.E.	Fighter Experimental—pusher-designed aircraft
R.E.	Reconnaissance Experimental—two-seat corps cooperation aircraft
S.E.	Scout Experimental—single-seat tractor-design fighter aircraft

Within the Cockpit

Airplanes of the First World War sported open cockpits, offering pilots little protection against 150 mph winds generated by the propeller and the near-freezing temperatures at high altitudes. Later in the war, pilots wore fleece-lined leather jumpsuits or a canvas combination lined with dog hair. Fur-lined hip boots protected their feet, and fur-lined mittens kept their hands warm. Leather helmets topped it all off. We've all seen pictures or movies of W.W.I pilots with scarves around their neck, flapping in the wind. In fact, these scarves were an absolute necessity, not only to provide warmth but to wipe the oil spraying from the rotary engine off their goggles.

The pilot's cockpit held all the controls and gauges for flying the plane. Within reach were joystick and rudder pedals for maneuvering, machine-gun trigger buttons on the stick, a blip switch for cutting ignition to reduce speed, throttles and carburetor valves to adjust altitude, a magneto contact switch, a valve to switch to an emergency fuel tank, a hand pump to pressurize gas tanks with air, a map board, and very little else. Usually, the pilot held a box of ammunition between his knees and sat directly beneath the butt of a machine gun, which was padded against a rough landing.

Flying instruments ranged from the laughably primitive to nonexistent. The most important gauge was a good clock. The pilot used an aneroid altimeter and a compass to get a bead on his general location. He measured air speed using a pitot tube or a sprung vane on the struts. Illuminated gauges for night flying didn't make their appearance until 1917.

Notably lacking were parachutes. Balloonists had them, but no other aviators were authorized to use parachutes (except the lucky German pilots, and even then not until the last year of the war). Pilots were denied them because the high command feared fliers might be tempted to abandon their planes.

Lay of the Land

Aircraft began carrying cameras as soon as the opening campaigns deadlocked at the Western Front. Trench fortifications were just too complex to

copy onto paper by hand. Cameras made it possible for others on the ground to analyze the terrain's tiniest feature after a pilot had completed his mission. At first, commercial cameras were simply held over the side of the aircraft to take these photos, but soon custom cameras were devised specifically for this purpose.

Second Lieutenant J.T.C. Moore-Brabazon and Lt. C.D.M. Campbell developed the first aviation camera for the Royal Flying Corps in 1914. Called the Model A, it was a 9-7/8–inch Zeiss-Tessar lens housed in a tapering wooden box. The Model C, and later the Model E, were constructed within a metal housing that held a magazine of a dozen gravity-fed photographic plates. Cameras evolved from hand-held to fuselage-mounted. To operate these cameras, pilots had to face a cold blast of air from the propwash, something they didn't particularly relish.

German motion-picture pioneer Oskar Messter introduced a roll-film camera in 1915 to replace the unwieldy photographic plate. Now the pilot had access to 100 feet of film that could make 250 4-by-4-inch negatives. A single crank by the observer advanced the film and cocked the camera shutter. Messter later developed a fully automatic camera, run off of a wind-driven propeller, for mapping over 37 miles at a stretch.

The French advanced strategic mapping of the entire German rear area to better track daily changes in formation. They developed cameras with focal lengths from 50 centimeters to 2.1 meters, allowing them to map enemy lines to a depth of 100 km each day. These photos were then turned into large blanket maps that replaced traditional maps altogether.

Aerial photoreconnaissance usually was performed from around 10,000 feet. From this height, a camera with an 8-inch focal length could photograph one square mile of land. In the last year of the war, the British took and developed 6.5 million photographs, the French took 675,000, and, in the last five months alone, the U.S. Air Service took 1.3 million.

Formations

It wasn't until the war's second year that formation flying came into its own. Before this, most planes simply flew alone.

The first organized formation flying developed as a defense against the Fokker Scourge in 1915. Maurice Farman of Escadrille MF25s under Capt. Harpe began flying in a V pattern to provide mutual machine-gun support against attacking Germans. Known as the "Vee" or "Vic" formation, it became the most popular flying pattern of the war. Boelcke began grouping fighters in larger formations of six planes, and Richthofen used the V-echelon formation for his brutal hunting patrols.

The V-echelon stepped the planes in three dimensions, with the leader in the front and lowest position, followed by others in two rows slanted up, back, and out. This group would fly at ¾ of their top speed so a flight member could zoom in front of the leader to bring attention to something.

Other formations served special purposes. A diamond formation of four planes was the best way to escort a two-seater. Bombers often flew in single file line-astern to coordinate bomb-dropping attacks. Fighters sometimes flew in line-abreast or single sloping echelon, both to facilitate communication among pilots and to widen their field of fire.

Five to seven planes became optimum for single-flight formations. Any fewer and the formation was too small to defend; any more and the formation became unwieldy. In 1918 the RAF conducted multiple squadron fighter sweeps in a grand formation. An army wing of the RAF usually included a couple of squadrons of Camels, S.E.5a's, and one Sopwith Dolphin squadron. These craft would meet and patrol together, each squadron flying in tiers about 2,000 feet above and three miles behind the others.

Good Luck

You can't expect a human to hop into a flimsy, unprotected aircraft, his or her life hanging by a thread, without resorting to some kind of superstitious be-

havior. What follows is a brief list of what some of the war's more talented pilots carried with them on every flight.

A. A. Kazakov: icon of St. Nicholas

Werner Voss: colored silk shirt to impress the women if he was shot down over Paris

Tab Pflaum: stuffed kangaroo

Eugene Bullard: pet monkey named Jimmy

Elliot White Springs: bottle of gin

Albert Ball: slice of plum cake

Jean Navarre: woman's silk stocking

Eddie Rickenbacker: crucifix in leather case

John Grider: piece of his first crash

Organizational Terminology

Number of Planes	British	American	French	German
6 or fewer	Flight	Flight	–	Kette
6–18	Squadron	Squadron	Escadrille	Staffel & Abteilung
20–80	Group	–	Groupe	Geschwader
90–300	Wing	Wing	Escadre	Stofl
200–400	Brigade	–	Groupement	Kofl
650	–	–	Division Aerienne	–
1000–4000	RAF	USAS	Aeronautique Militairie	Luftstrei-krafte

Armament

Fixed Synchronized Machine Guns

Vickers Mk. I

Made In: Britain
Caliber: .303 in
Rate of Fire: 500 rds/min
Ammo Supply: Belt feed
Date Created: 1915
Weight: 28.5 lb

Spandau LMG 08/15

Made In: Germany
Caliber: 7.92 mm
Rate of Fire: 450 rds/min
Ammo Supply: Belt feed
Date Created: 1915
Weight: 13 kg

Schwarzlose M 7/12 MG

Made In: Austria-Hungary
Caliber: 8 mm
Rate of Fire: 420 rds/min
Ammo Supply: Belt feed
Date Created: 1915
Weight: 13.2 kg

Marlin Model 1917/18

Made In: U.S.
Caliber: .30 in
Rate of Fire: 650 rds/min
Ammo Supply: Belt feed
Date Created: 1917
Weight: 10 kg

Flexible Mounted Machine Guns

Lewis Mk. I

Made In: Britain and Belgium
Caliber: .303 in
Rate of Fire: 550 rds/min
Ammo Supply: 47-round magazine
Date Created: 1915
Weight: 25.25 lb

Parabellum IMG 14

Made In: Germany
Caliber: 7.92 mm
Rate of Fire: 700 rds/min
Ammo Supply: Belt in 250-rd drum
Date Created: 1915
Weight: 9.5 kg

Hotchkiss Modele 1909

Made In: France
Caliber: 8 mm

Rate of Fire: 600 rds/min
Ammo Supply: 25-round strip
Date Created: 1914
Weight: 12.25 kg

Revelli Modello 1914

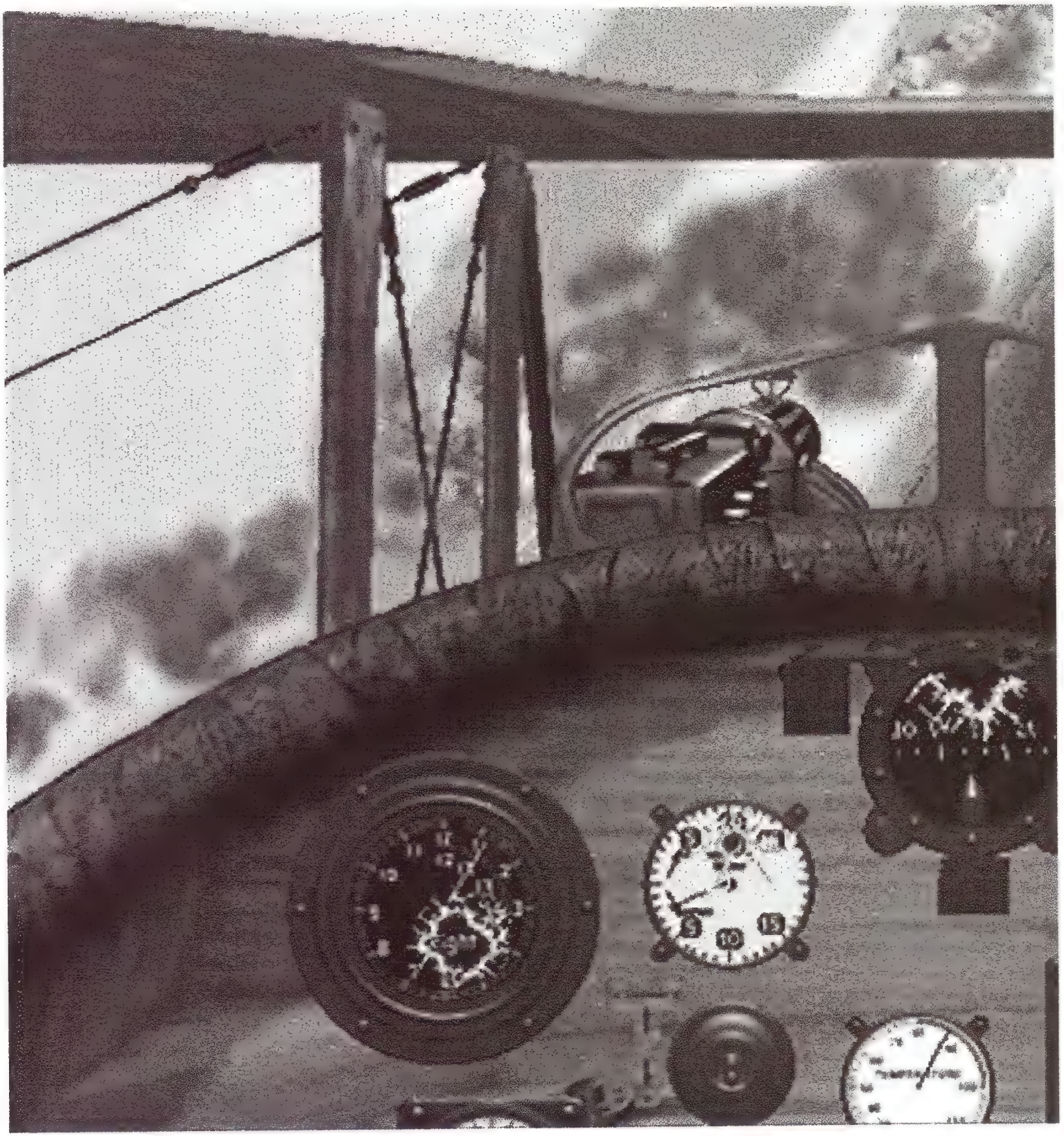
Made In: Italy
Caliber: 6.5 mm
Rate of Fire: 450 rds/min
Ammo Supply: 50-cartridge box
Date Created: 1915
Weight: 17 kg

Colt-Browning 1895—1914

Made In: U.S.
Caliber: .30 in
Rate of Fire: 450 rds/min
Ammo Supply: Spooled belt
Date Created: 1914
Weight: 15.87 kg

Madsen 1902

Made In: Russia
Caliber: 7.62 mm
Rate of Fire: 425 rds/min
Ammo Supply: 25- or 40-rd magazine
Date Created: 1915
Weight: 9.07 kg



6

The Planes of Red Baron II

The game *Red Baron II* features a variety of aircraft. If you're participating in a Campaign game, you'll fly planes based in that particular time period. You'll acquire an understanding of what pilots of that era had to work with, and the incredible advances being made almost monthly.

Every plane in the library has its strengths and weaknesses. The shrewd pilot will take out each plane and put it through its paces before entering combat. Nothing's worse than getting into a heated conflict, banking hard, and watching your wings fall off because you were unfamiliar with your aircraft's stress level.

Practice is key. Learn what each plane has to offer, and what its drawbacks are. Some planes can turn a tighter circle than others; some aircraft can climb and perform better at higher altitudes. Remember, you and your machine are one.

The planes in the stationary-engine group—the RAF S.E.5a, Albatros D III, and Spad S.13—were high-performance aircraft with high speeds and good, sustained climbs. They were relatively stable in flight and were generally easier to control than rotary-engine aircraft.

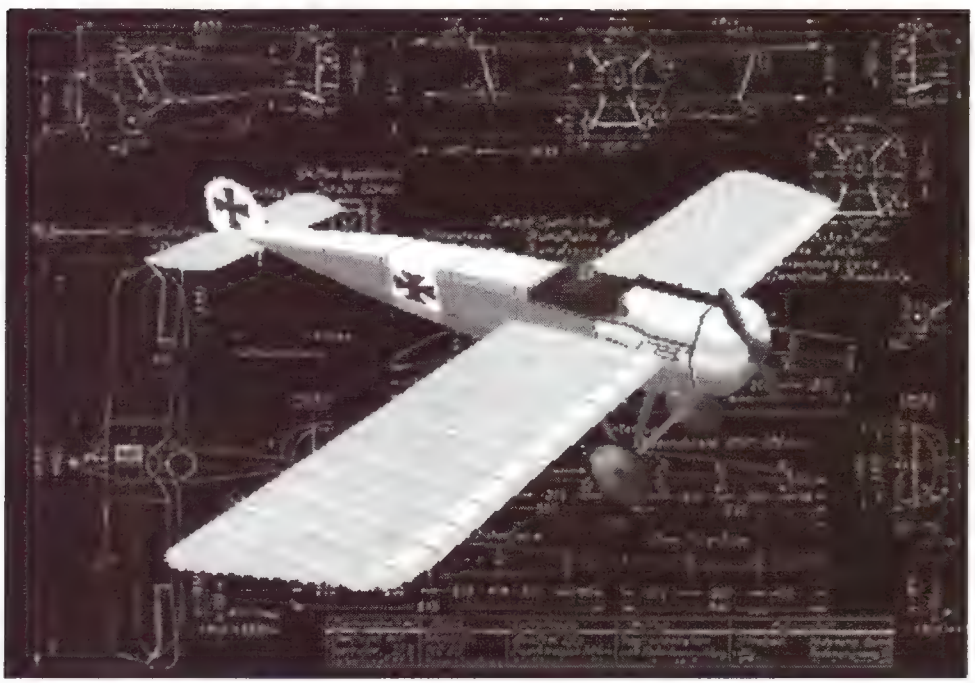
The rotary engine was temperamental and vulnerable to mistreatment. For instance, you couldn't let an aircraft fitted with a rotary engine sit on the ground with its prop spinning. To avoid an engine meltdown, the plane had to be airborne within minutes of ignition.

Fuel delivery on the rotary engine was complicated. The pilot had to balance air and fuel intakes, and even then the range of control was limited. In fact, on early rotary engines the pilot had a blip switch: He could choose between no power and full power. But it wasn't just the fuel-delivery system that made rotary-engine aircraft difficult to master. The huge mass of the engine rotating at high speed created large gyroscopic effects that forced the aircraft to nose down in right turns and nose up in left turns. These forces often surprised inexperienced pilots and caused several training fatalities.

Please note that not all information is available on all planes

German Aircraft

Fokker E III



Manufacturer: Fokker Flugzeug-Werke GmbH
Introduced: October 15, 1915
Number Built: 150
Type: Fighter
Engine(s): Oberusel U.I 100 hp 9-cylinder rotary
Wingspan: 31 ft 2 in
Length: 23 ft 7 in
Gross Weight: 1342 lbs
Max Speed: 88 mph
Ceiling: 11,500 ft

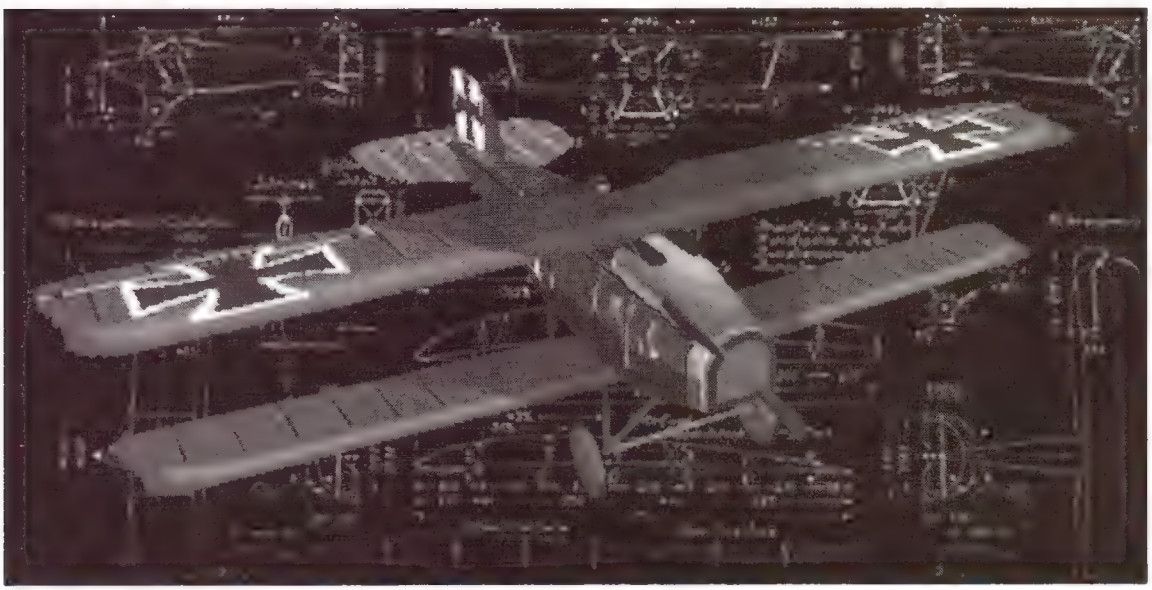
Endurance: 2 hrs

Crew: One

Armament: One or two Spandau 7.92 mm machine guns

The Eindecker was the first German aircraft armed with a synchronized, forward-firing machine gun. Pilots were ordered not to cross over enemy lines for fear the Allies would capture the secrets of the synchronizing gear. The Eindecker ruled the skies until the Nieuports and Spads were developed. The improved Fokker E III was the ultimate Eindecker. Although underpowered and slow, it could out turn most of the Allied aviators. Those who faced it were called "Fokker fodder."

Albatros D II



Manufacturer: Albatros Werke GmbH

Introduced: October 1, 1916

Type: Fighter

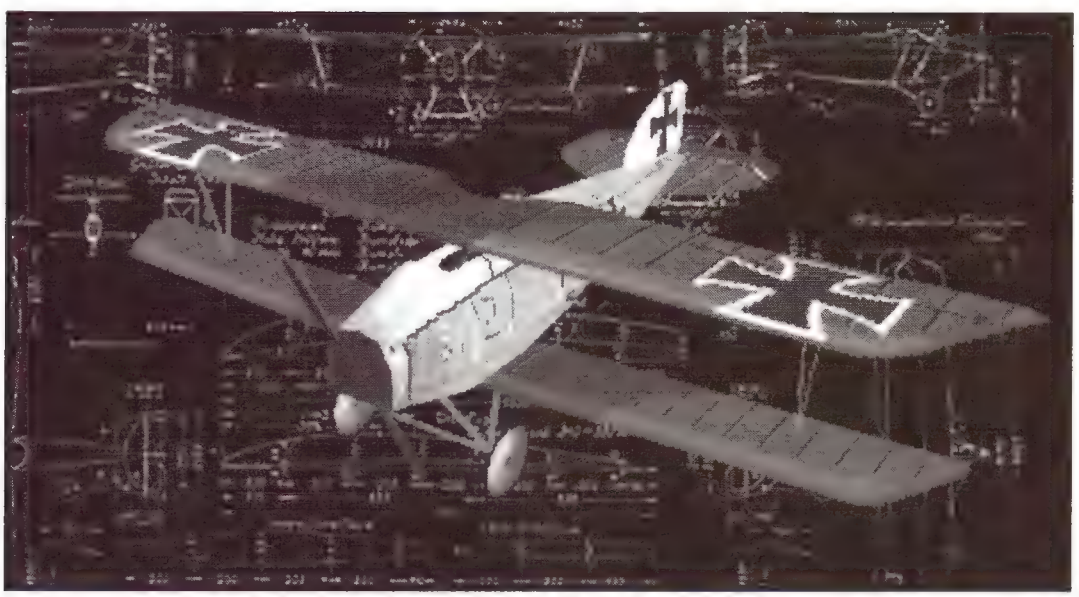
Engine(s): Mercedes 160 hp

Wingspan: 27 ft 10 in

Gross Weight: 1,954 lb
Max Speed: 109 mph
Ceiling: 17,060 ft
Endurance: 1.5 hrs
Crew: One
Armament: Two Spandau machine guns

The Albatros D II was a modified version of the Albatros D I. Pilots complained that the D I offered poor visibility from the cockpit. To solve this problem, the D II's upper wing was brought closer to the fuselage. Mounted to the fuselage in front of the pilot, the D II's twin, synchronous machine guns set the standard for other German and Allied fighters. By the end of 1916, increased production of the Albatros gave Germany numerical superiority in the air war.

Albatros D III

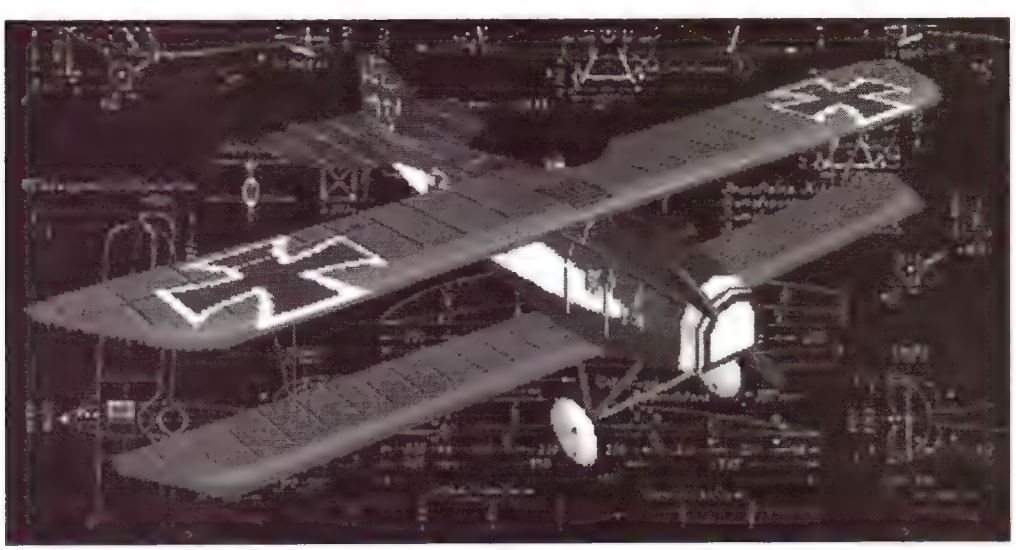


Manufacturer: Albatros Werke GmbH
Introduced: January 1917

Number Built: 1,350
Type: Fighter
Engine(s): Mercedes high-compression 160 hp/Oberusel U.III 163 hp
Wingspan: 29 ft 8 in
Length: 24 ft
Gross Weight: 1,949 lb
Max Speed: 109 mph
Ceiling: 18,000 ft
Endurance: 2 hrs
Crew: One
Armament: Two Spandau light machine guns

Agile and heavily armed, the D III resembled earlier models. Using V-struts, the size of the lower wing was reduced to improve downward visibility. But the struts allowed the wing to twist in flight. Manfred von Richthofen, one of the first pilots to receive the new plane, experienced this problem firsthand when the lower wing of his D III cracked in flight.

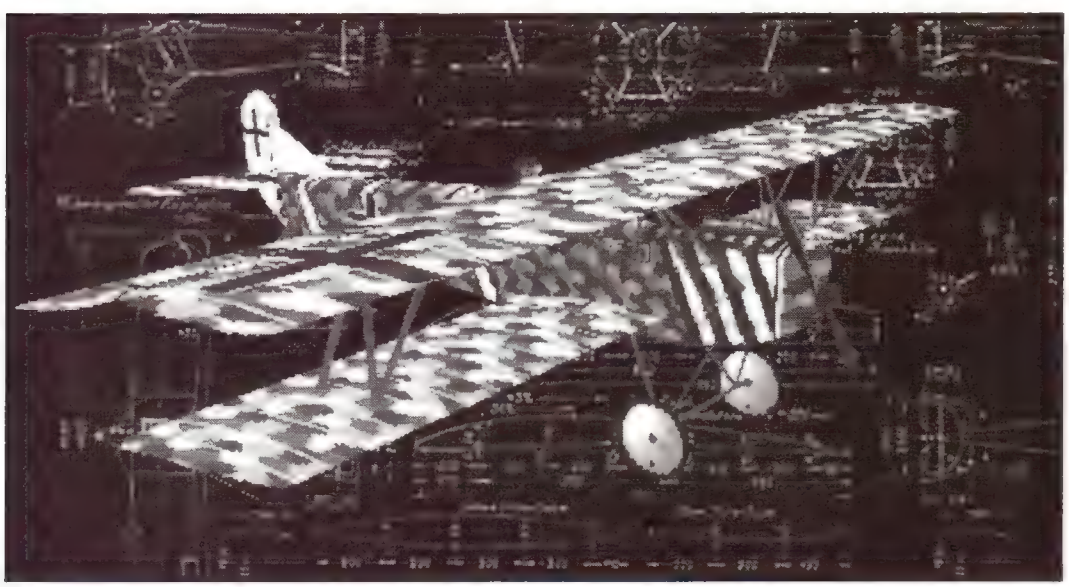
Albatros D V



Manufacturer: Albatros Werke GmbH
Introduced: 1917
Type: Fighter
Engine(s): Mercedes IIIa 180 hp
Ceiling: 20,000 ft
Endurance: Two hrs
Crew: One
Armament: Two Spandau light machine guns

The Albatros D V and D Va retained the wing and tail design of the Albatros D III. As soon as the D V entered service, wing failure caused a series of fatal crashes. Small struts and additional wire bracing were added to increase wing strength and pilots were warned not to dive too steeply when flying the D V, but the crashes continued.

Fokker D VII



Manufacturer: Fokker Flugzeug-Werke GmbH
Introduced: May 1918

Type: Fighter

Engine(s): Mercedes D.III 160 hp 6-cylinder water-cooled inline/BMW IIIa 185 hp inline

Wingspan: 29 ft 3.5 in

Length: 22 ft 11.5 in

Height: 9 ft 2.5 in

Empty Weight: 1,540 lb

Gross Weight: 1,939 lb

Max Speed: 118 mph (Mercedes)/124 mph (BMW)

Ceiling: 18,000 ft (Mercedes)/21,000 ft (BMW)

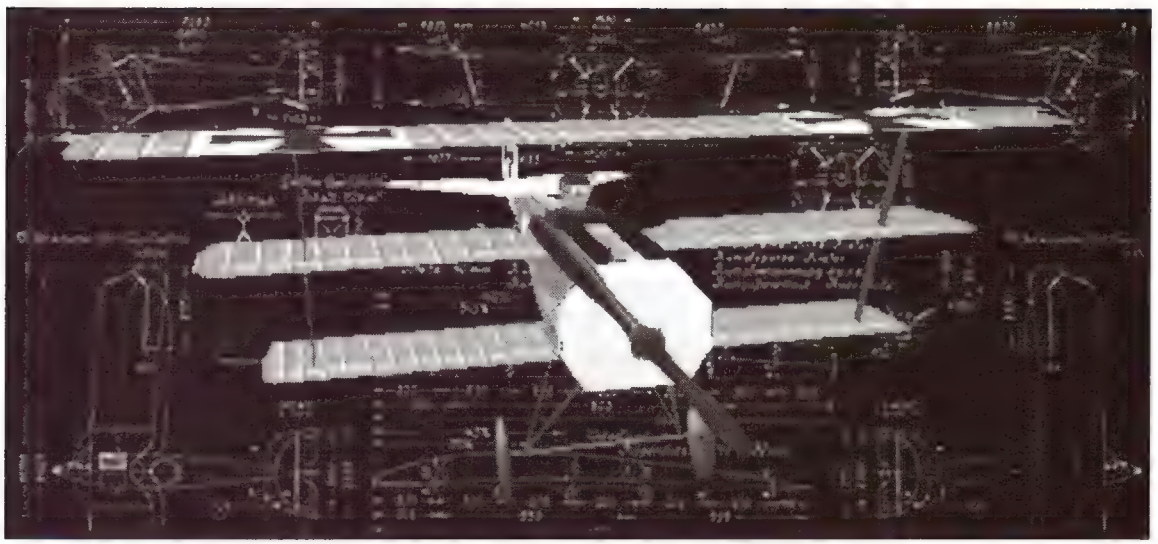
Endurance: 1.5 hrs

Crew: One

Armament: Two Spandau 7.92 mm machine guns

The development of the Fokker D VII was championed by Manfred von Richthofen. Although he flew the D VII in trials, Richthofen never had an opportunity to test the aircraft in combat. He was killed before the D VII entered service. Though not as maneuverable as the Fokker Dr I, the D VII became widely regarded as the best German aircraft of the war. It wasn't particularly fast, but it was durable and easy to fly, and proved more than a match for any British or French fighter. Hermann Goering was one of the first pilots to fly the D VII in combat.

Fokker Dr I



Manufacturer: Fokker Flugzeug-Werke GmbH

Introduced: August 1917

Number Built: 320

Type: Fighter

Engine(s): Oberusel U.R.II, 9-cylinder 110 hp reciprocating/Le Rhone, 9-cylinder 110 hp rotary (from captured aircraft)

Wingspan: 23 ft 7-3/8 in

Length: 18 ft 11-1/8 in

Height: 9 ft 8 in

Empty Weight: 893 lb

Gross Weight: 1,289.2 lb

Max Speed: 103.12 mph

Ceiling: 20,013 ft

Endurance: 1.5 hrs

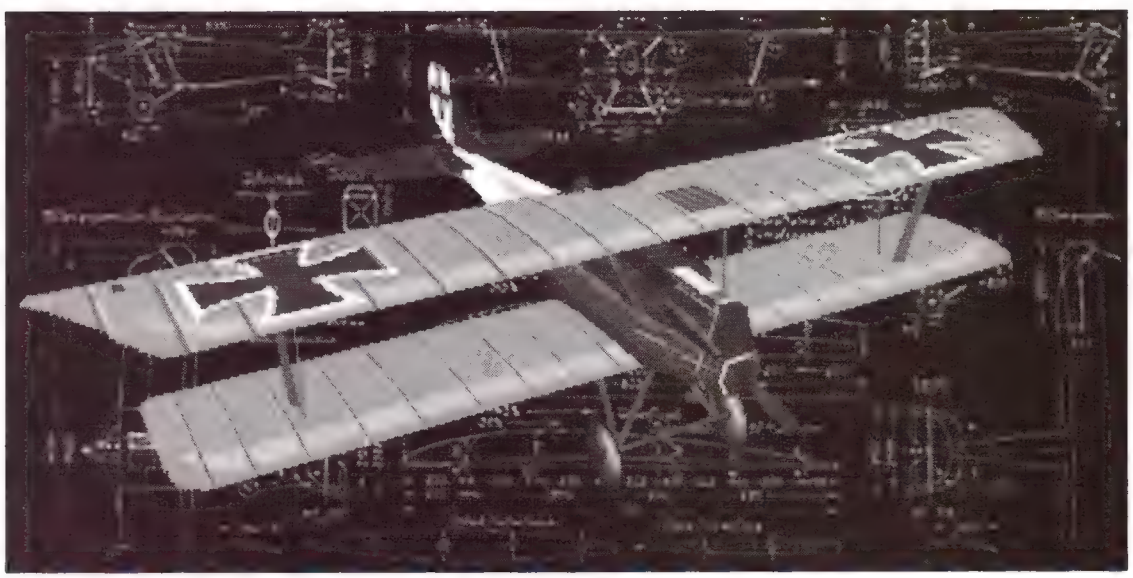
Crew: One

Armament: Two Spandau 7.92 mm light machine guns

The Fokker Dr I was modeled on the Sopwith Triplane. Although not as fast as the biplanes, the Dridecker was small, lightweight, and highly maneuverable, with good upward visibility. It lacked the traditional bracing wires that could be shot away during combat. This combination made it an excellent plane in a dogfight.

When it entered service, it was scoffed at until pilots like Werner Voss showed what it could do in a fight. Flying a Dr I, Voss shot down 22 British aircraft in 21 days. Unfortunately, structural difficulties with the wings killed several pilots, and the Dr I was temporarily withdrawn from service. Despite improvements, its reputation among German pilots never recovered.

Pfalz D III



Manufacturer: Pfalz Flugzeug-Werke

Introduced: July 1917

Number Built: Appr. 600

Type: Fighter

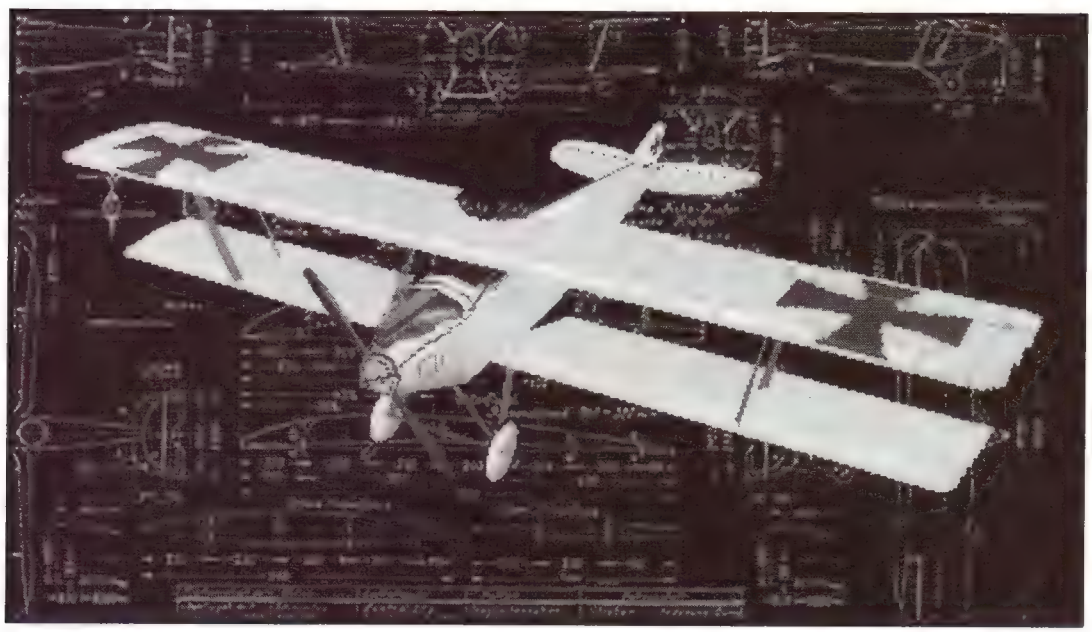
Engine(s): Mercedes 160 hp inline

Wingspan: 30 ft 10 in

Length: 22 ft 10 in
Gross Weight: 2,055 lb
Max Speed: 102 mph
Ceiling: 17,060 ft
Endurance: 2.5 hrs
Crew: One
Armament: Two Spandau 7.62 mm machine guns

Although not a great fighter aircraft, the rugged and reliable Pflaz D III was very fast in a dive and was frequently used to attack and destroy observation balloons. It served mainly with Bavarian Jagdstaffeln from late 1917 until the final months of the war.

Albatros C III



Type: Reconnaissance, bomber
Engine(s): Mercedes D.III 160 hp
Wingspan: 38 ft 5 in

Max Speed: 87 mph

Ceiling: 11,155

Crew: Two

Armament: 198 lbs bomb load

Sturdy and reliable, the Albatross C.III was an excellent reconnaissance and artillery aircraft. It could carry a small bomb load and is armed with a fixed synchronized Spandau forward and a flexible Parabellum machine gun in the rear.

Rumpler C IV

Type: Reconnaissance

Engine(s): Mayback Mb. IV 240 hp

Wingspan: 41 ft 2 in

Max Speed: 109 mph

Ceiling: 23,944

Crew: Two

Armament: One Parabellum machine gun

The Rumpler C.IV was probably the best recon fighter of the entire war. Extremely fast for a two-seater, it could outrun most Allied fighters. Its high compression engine allowed it to fly at altitudes well over 15,000 feet. Allied pilots held the Rumpler in very high regard throughout the war.

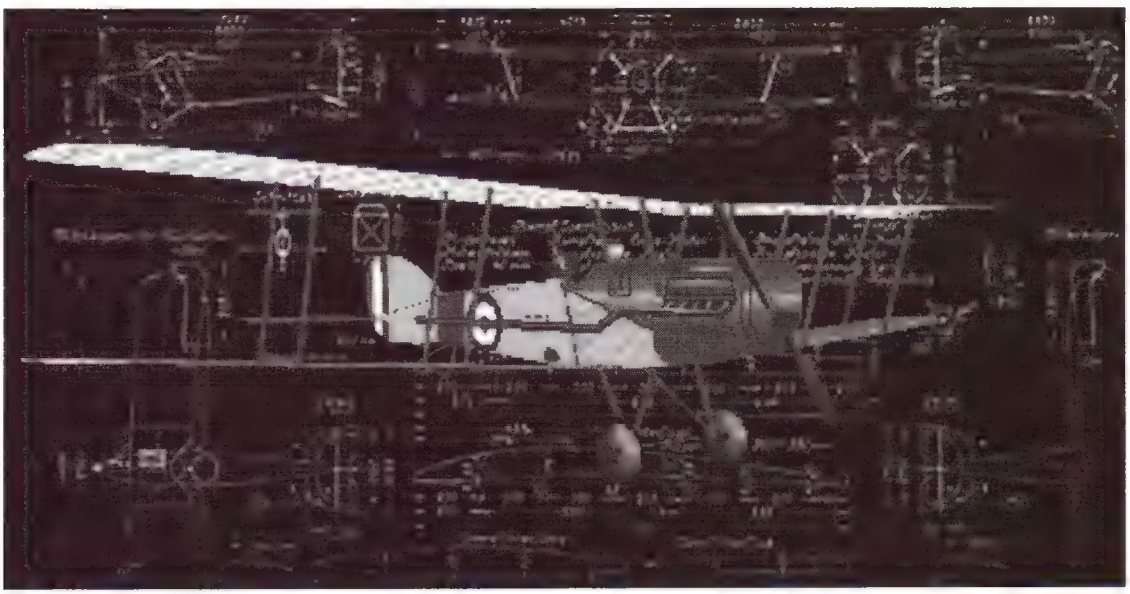
Halberstadt CL II

Type: Escort, attack
Engine(s): Mercedes D.III 160 hp
Wingspan: 35 ft 4 in
Max Speed: 103 mph
Ceiling: 16,732 ft
Crew: Two
Armament: One Spandau machine gun, one Parabellum machine gun

The Halberstadt CL.II was a two-seat infantry attack plane that equipped the Schlastastaffeln throughout 1917 and 1918. Tough and fast, it proved to be a formidable opponent.

Allied Aircraft

Bristol Fighter



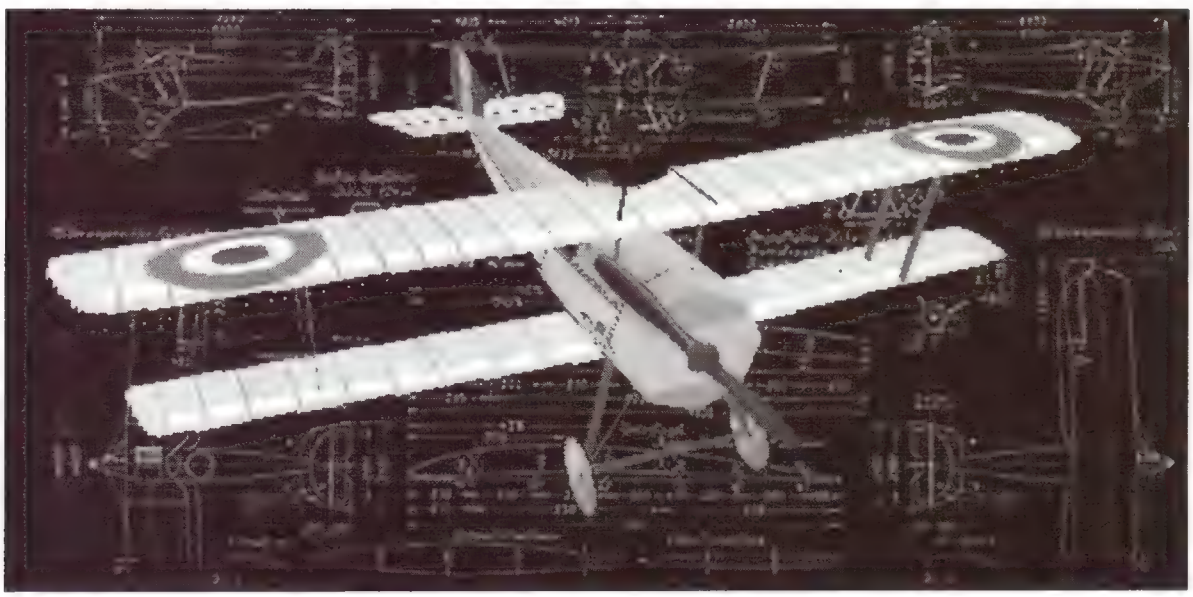
Manufacturer: British and Colonial Aeroplane Company
Introduced: 1917
Number Built: 5,308
Type: Fighter, bomber, reconnaissance
Engine(s): Rolls-Royce Falcon III 281 hp (205 kW) water-cooled inline
Wingspan: (11.96 m)
Length: (7.87 m)
Height: (2.97 m)
Empty Weight: (975 kg)
Gross Weight: (1474 kg)
Max Speed: 123 mph (198 kmh)
Ceiling: 18,000 ft (5490 m)

Crew: Two

Armament: Two or three machine guns

The versatile Bristol Fighter, or "Brisfit," was a maneuverable, heavily armed two-seater. It carried three machine guns and could hold its own in a dog-fight against even the best German fighters of the war. The highest-scoring ace for this aircraft was Andrew McKeever, a Canadian, with 31 victories.

Nieuport 11



Manufacturer: Societe Anonyme des Etablissements Nieuport

Introduced: July 1915

Type: Fighter

Engine(s): Gnome 80 hp rotary/Le Rhone 9C80 hp 9-cylinder air-cooled rotary

Wingspan: 24 ft 9 in

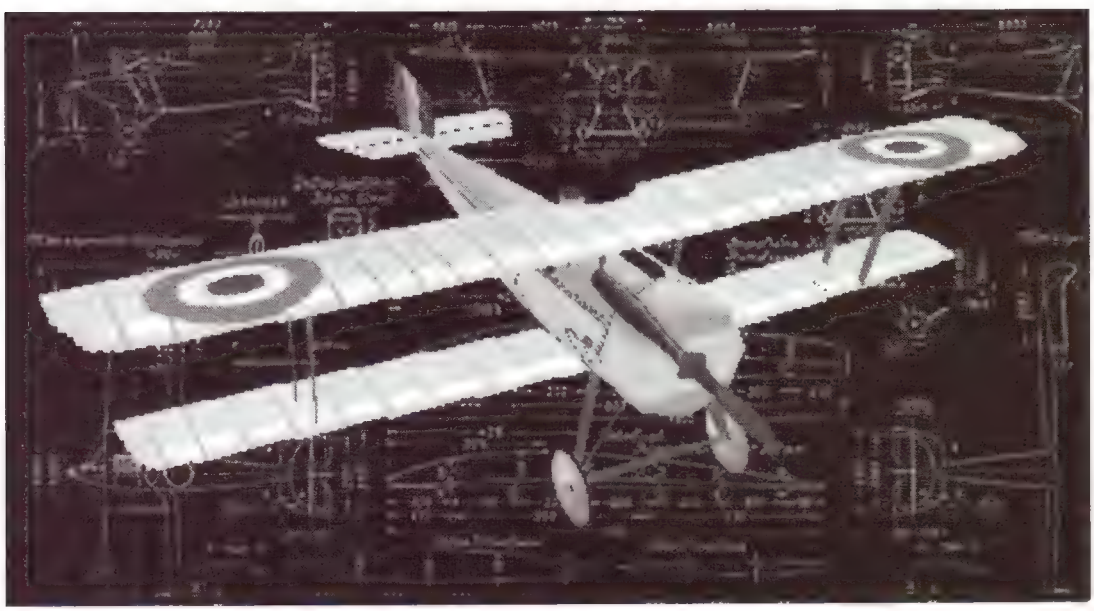
Length: 19 ft 1/3 in

Height: 8 ft 1/2 in

Gross Weight: 1,060 lb
Max Speed: 97 mph
Ceiling: 15,090 ft
Endurance: 2.5 hrs
Crew: One
Armament: One Lewis machine gun, mounted on the upper wing

The small Nieuport 11 was affectionately known as "Bebe" (baby). Originally designed for racing, this light plane was fast and extremely maneuverable. Its only major problem was the design of its wing struts. In a steep dive, the struts allowed the wings to twist, sometimes with disastrous results. Used by the British and French to counter the Fokker E III, the Nieuport's only disadvantage was its lack of a synchronized machine gun.

Nieuport 17



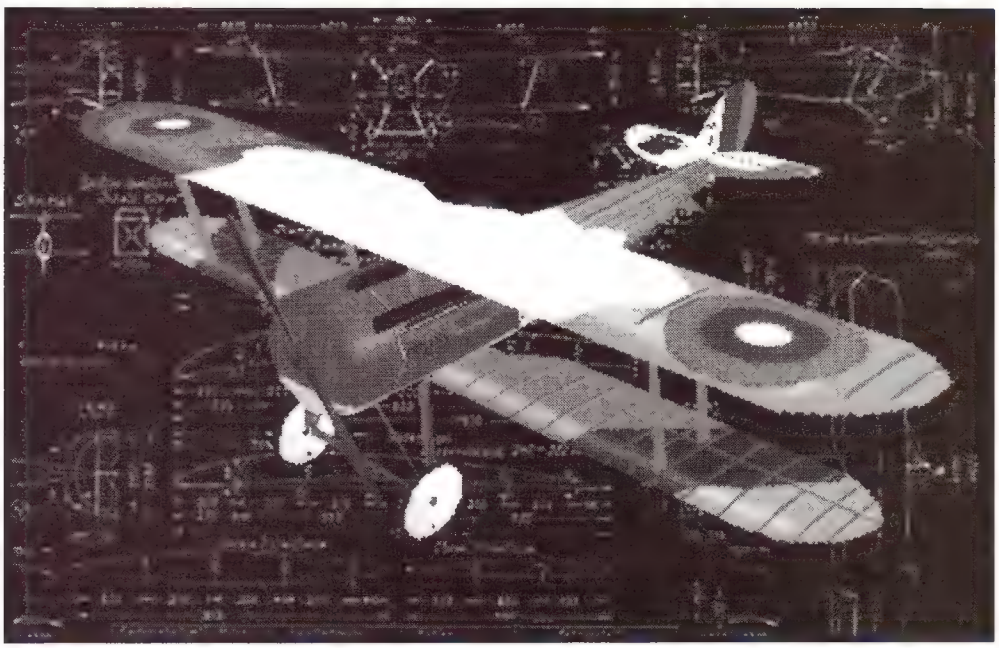
Manufacturer: Societe Anonyme des Etablissements Nieuport
Introduced: April 2, 1916

Type: Fighter
Engine(s): Le Rhone 9J 110 hp 9-cylinder rotary
Wingspan: 26 ft 11 in
Length: 18 ft 10 in
Height: 7 ft 10 in
Empty Weight: 827 lb
Gross Weight: 1,246 lb
Max Speed: 110 mph
Ceiling: 17,388 ft
Endurance: 1.8 hrs
Crew: One
Armament: One Lewis and/or one Vickers .303 machine gun

Many French and British aces began their careers flying the Nieuport 17. The highly maneuverable "Superbebe" was a larger, improved version of the Nieuport 11. Like its predecessor, initially it was equipped with a Lewis gun but was upgraded to a synchronized Vickers machine gun. The Nieuport 17 easily outclimbed and outperformed the Fokker E III, helping end Germany's domination of the air war. Its superior design was so successful the German high command ordered it copied.

The highest-scoring ace for the Nieuport 17, Nieuport 23, and Nieuport 27 was Philip Fullard, an Englishman, with 40 victories.

Nieuport 28



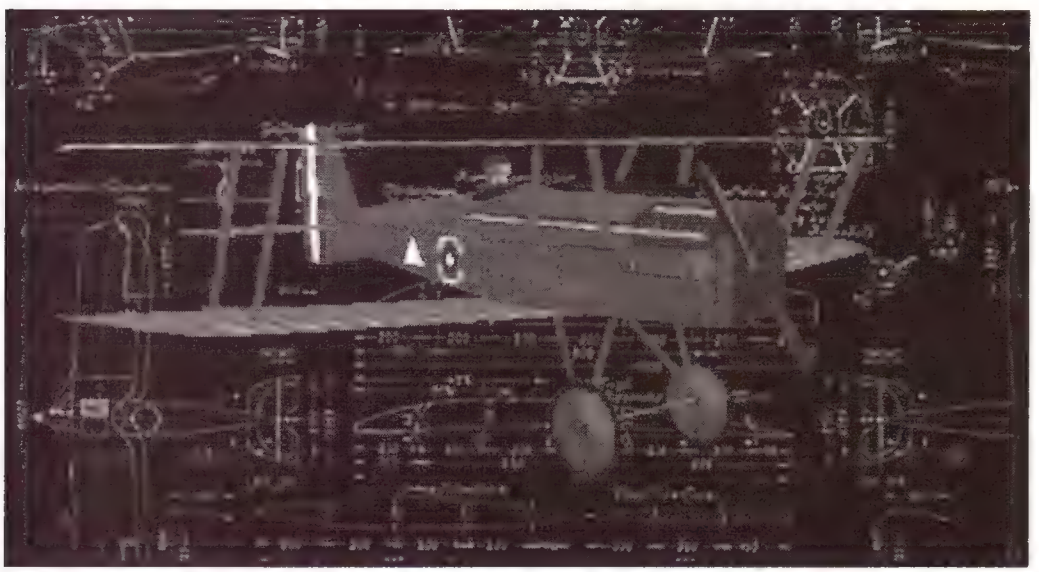
Manufacturer: Societe Anonyme des Etablissements Nieuport
Introduced: 1917
Type: Fighter
Engine(s): Gnome Monosoupape 9N 160 hp 9-cylinder air-cooled rotary
Wingspan: 26 ft 9 in
Length: 20 ft 3 in
Height: 8 ft
Empty Weight: 1,250 lb
Gross Weight: 1,540 lb
Max Speed: 123 mph
Ceiling: 20,000 ft
Endurance: 1.5 hrs

Crew: One

Armament: Two Vickers .303 machine guns

The Nieuport 28 was the first fighter aircraft received by squadrons of the United States Air Service after they arrived in France. It was fast and maneuverable, but in a sufficiently steep dive it tended to shed its upper wing fabric. The Nieuport 28 was replaced by the less maneuverable but more reliable Spad S.13.

RAF S.E.5a



Manufacturer: Royal Aircraft Factory

Introduced: June 15, 1917

Number Built: 5,205 (S.E.5 and S.E.5a)

Type: Fighter

Engine(s): Hispano-Suiza 200 hp water-cooled (manufacturing problems

Wingspan: 26 ft 1/2 in

Length: 20 ft 11 in

Height: 9 ft 6 in

Empty Weight: 1,399 lb

Gross Weight: 2,048 lb

Max Speed: 133 mph

Ceiling: 19,500 ft

Endurance: 2.3 hrs

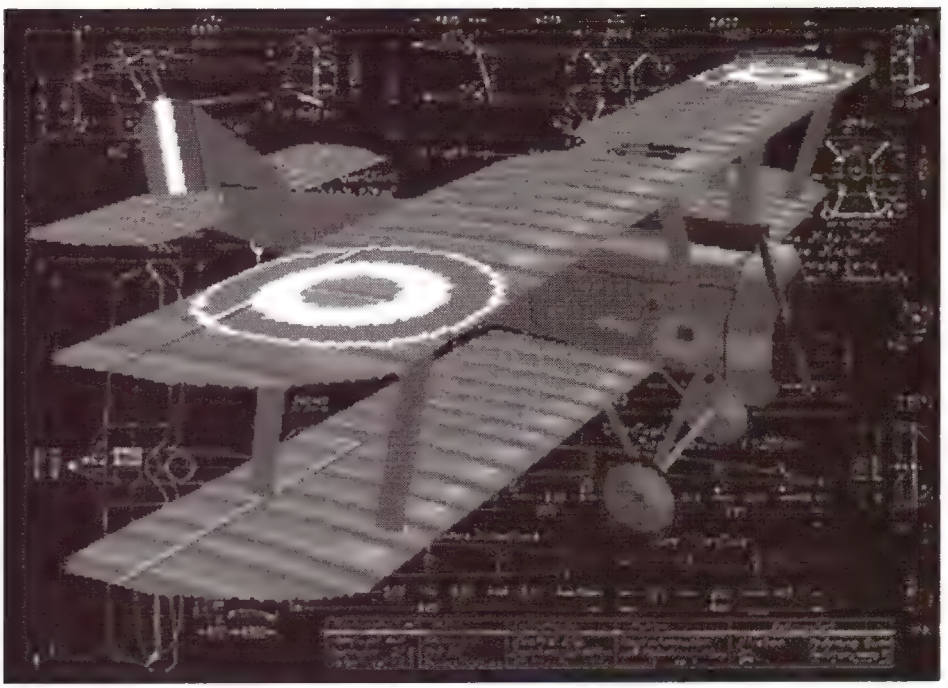
Crew: One

Armament: One Vickers .303 machine gun (port side of fuselage)/one Lewis .303 machine gun (atop upper wing)

Not long after developing the S.E.5, the RAF introduced the improved S.E.5a. It was strong, fast, and easy to fly. When it entered the war, it was superior to all its German opponents. Although disdained by Albert Ball, in the hands of William Bishop and Edward Mannock the S.E.5a developed a reputation as a formidable fighter.

The highest-scoring ace for this aircraft was Anthony Beauchamp Proctor, with 54 victories.

Sopwith Camel



Manufacturer: Sopwith Aviation Company
Introduced: 1916
Number Built: 5,490
Type: Fighter
Engine(s): Le Rhone 110 hp reciprocating rotary
Wingspan: 28 ft
Length: 18 ft 8 in
Height: 8 ft 6 in
Empty Weight: 889 lb
Gross Weight: 1,422 lb
Max Speed: 118 mph
Ceiling: 19,000 ft
Endurance: 2.5 hrs

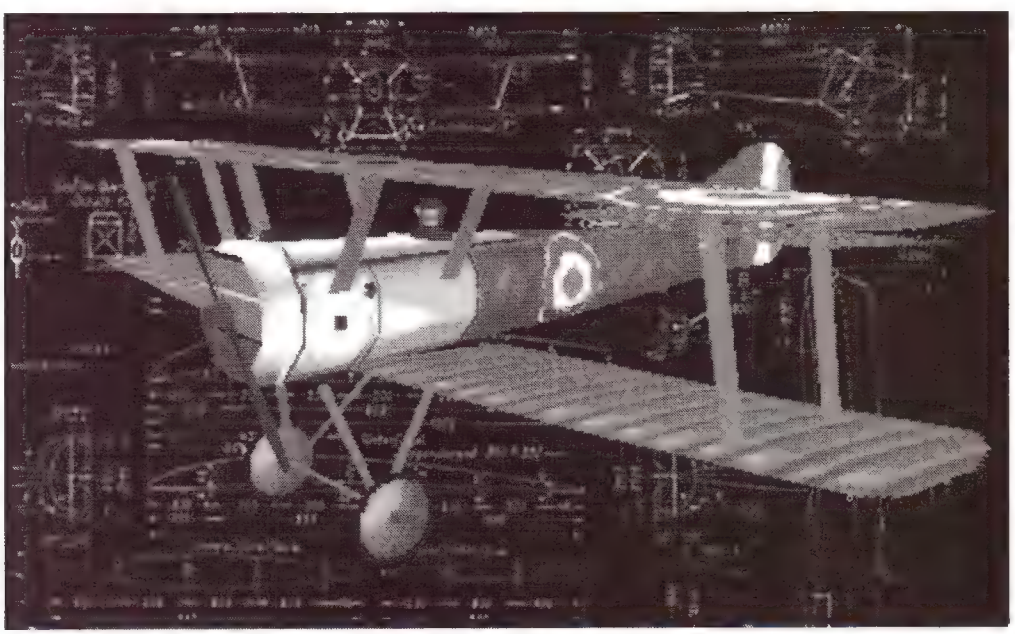
Crew: One

Armament: Two Vickers .303 machine guns (F.1), *or* one Vickers .303 machine gun and one Lewis .303 machine gun, *or* two Lewis .303 machine guns (2F.1)

An agile, highly maneuverable biplane, the Sopwith Camel accounted for more aerial victories than any other Allied aircraft. It was called the "Camel" due to the humped fairing over its twin machine guns. Like a real camel, this aircraft could turn and bite you. It was noted for its tendency to kill inexperienced flyers, and many pilots feared its vicious spin characteristics.

The Sopwith Camel's first victory came on June 4, 1917, when Alexander Shook, a Canadian, shot down an Albatros D III. Roy Brown was flying a Camel when he shot down Manfred von Richtofen. The highest-scoring ace for this aircraft was Donald MacLaren, a Canadian, with 54 victories.

Sopwith Pup



Manufacturer: Sopwith Aviation Company

Introduced: October 1916

Type: Fighter

Engine(s): Le Rhone 9C 80 hp 9- cylinder air-cooled rotary/Gnome Monosoupape 100 hp air-cooled rotary

Wingspan: 26 ft 6 in

Length: 19 ft 3 in

Height: 9 ft 5 in

Empty Weight: 856 lb

Gross Weight: 1,225 lb

Max Speed: 106 mph

Ceiling: 18,500 ft

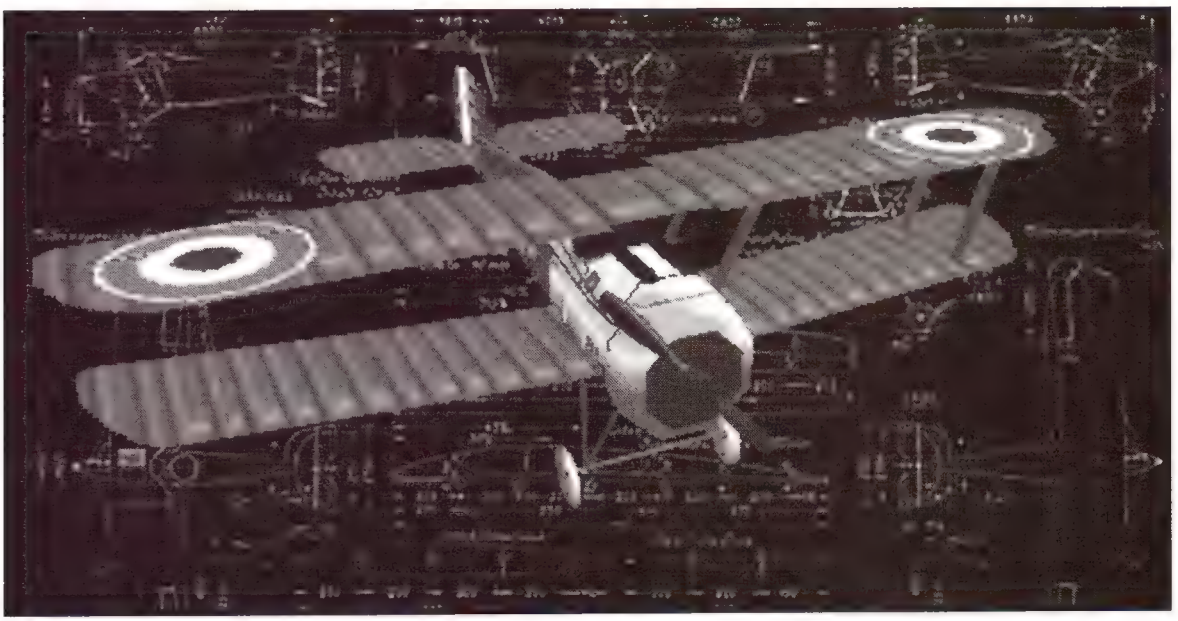
Endurance: 3 hrs

Crew: One

Armament: One Vickers .303 machine gun

The Sopwith Pup quickly became a favorite with pilots of the Royal Naval Air Service. It was superior to the Fokker D III and more than a match for any of the new Halberstadt and Albatros scouts. Armed with a single synchronous machine gun, it was lighter and less dangerous than its successor, the Sopwith Camel. Although it was underpowered, pilots liked the plane because it was maneuverable and fast. It could climb and hold its altitude better than any other fighter. In August 1917, the Sopwith Pup was the first aircraft to land aboard a moving ship (the Royal Navy's H.M.S. *Furious*).

Sopwith Snipe

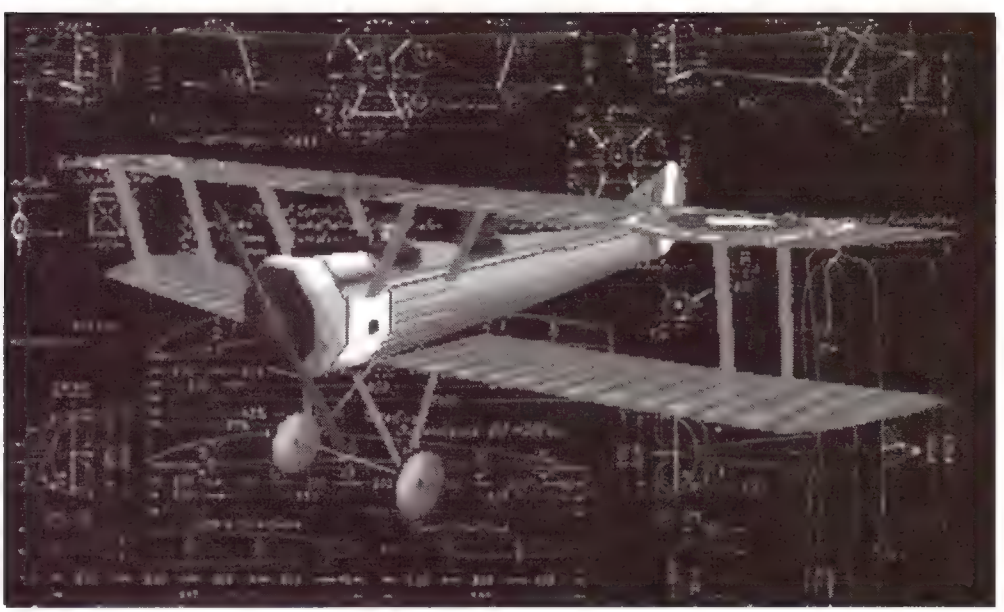


Manufacturer: Sopwith Aviation Company
Introduced: 1918
Number Built: 497
Type: Fighter
Engine(s): Bentley B.R.2 230 hp
Wingspan: 31 ft 1 in
Length: 19 ft 10 in
Height: 9 ft 6 in
Empty Weight: 1,312 lb
Gross Weight: 2,020 lb
Max Speed: 121 mph
Ceiling: 19,500 ft
Endurance: 3 hrs
Crew: One
Armament: Two machine guns

A descendant of the Sopwith Camel, the Snipe was equipped with a more powerful engine and provided better visibility from the cockpit. Though not much faster than the Camel, the Snipe had a better rate of climb and pilots found it much easier to fly.

On October 27, 1918, William Barker made the Sopwith Snipe famous in a lone battle with more than 60 enemy aircraft, earning him the Victoria Cross. The highest-scoring ace for this aircraft was Elwyn King, an Australian, with seven victories.

Sopwith Strutter



Manufacturer: Sopwith Aviation Company

Introduced: 1916

Number Built: Appr. 6,000

Type: Initially a fighter, used later for reconnaissance and bombing

Engine(s): Clerget 130hp

Wingspan: 33 ft

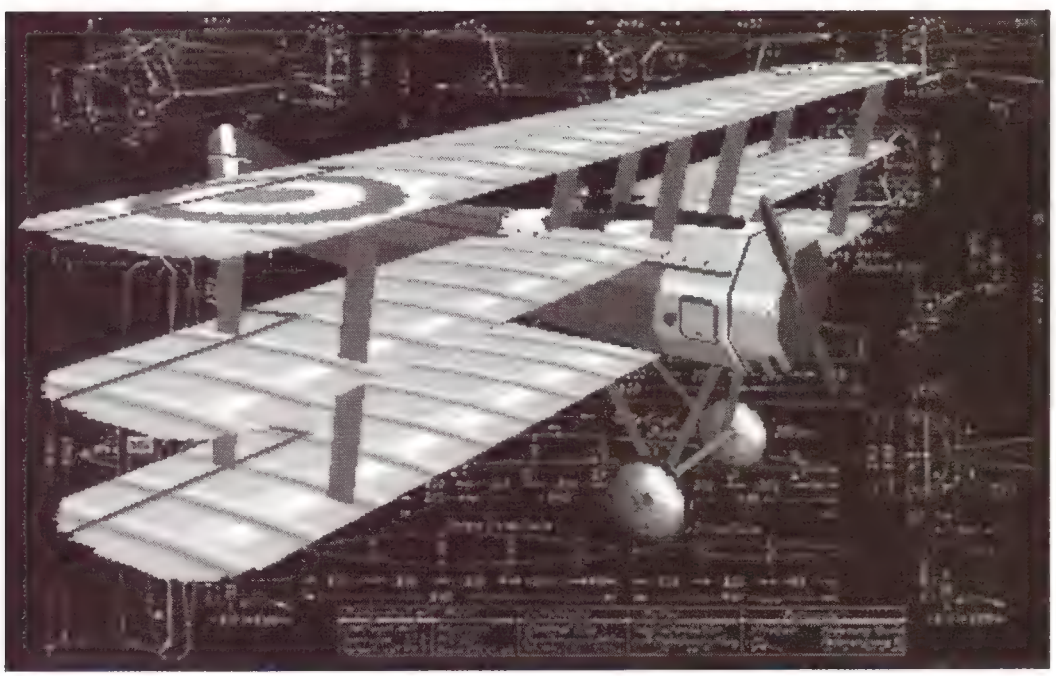
Length: 25 ft

Height: 10 ft
Empty Weight: 2,150 lbs
Max Speed: 105 mph
Ceiling: 15,000 ft
Endurance: 3 hrs
Crew: One or two
Armament: Two 7.7 mm machine guns, 8 bombs

The first British fighter equipped with a fixed, forward-firing, synchronized machine gun, the Strutter was built in both one- and two-seater models. Not long after its introduction, it was replaced by the Sopwith Pup.

The highest-scoring ace for this aircraft was Geoffrey H. Cock, an Englishman, with 13 victories.

Sopwith Triplane



Manufacturer: Sopwith Aviation Company

Introduced: November 1916

Number Built: 152

Type: Fighter

Engines: Clerget 9Z 110 hp 9-cylinder air-cooled rotary, Clerget 9B 130 hp rotary, Le Rhone 110 hp 9-cylinder

Wingspan: 26 ft 6 in

Length: 19 ft 6 in

Height: 10 ft 6 in

Empty Weight: 1,101 lb

Gross Weight: 1,415 lb

Max Speed: 116 mph

Ceiling: 29,000 ft

Endurance: 2 hrs

Crew: One

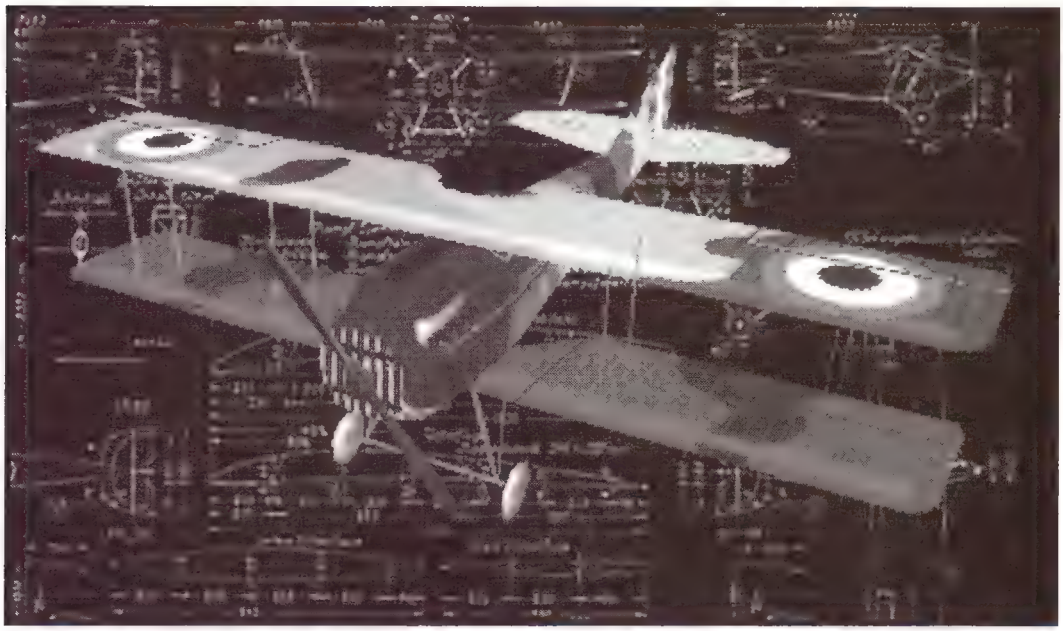
Armament: One synchronized Vickers .303 machine gun

The Royal Naval Air Service used the Sopwith Triplane in combat. The three-wing stack reduced wingspan and increased wing area, making it handle and climb better than biplanes. Visibility from the cockpit was outstanding, but the "Tripe" was slower and less heavily armed than its German opponents.

The Germans were impressed with its performance and a captured Triplane inspired the development of the Fokker Dr I. The Triplane was eventually withdrawn from service and replaced with the Sopwith Camel.

The Black Flight, commanded by Raymond Collishaw, shot down 87 German aircraft in three months while flying the Sopwith Triplane. Collishaw, a Canadian, was the highest-scoring ace for this aircraft, with 33 victories.

Spad S VII

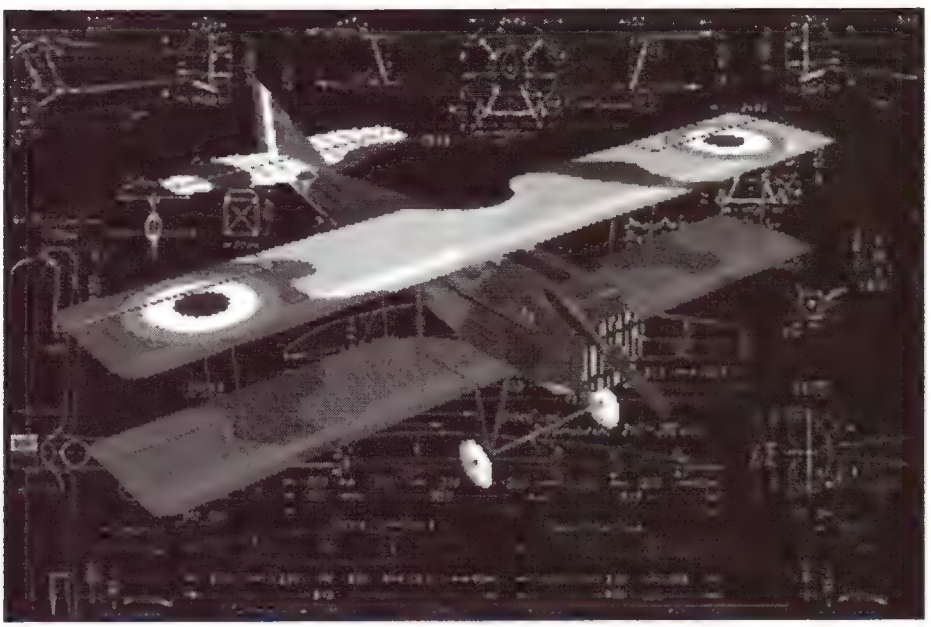


Manufacturer: Societe Anonyme pour l'Aviation et ses Derives
Introduced: October 1, 1916
Number Built: 3,825
Type: Fighter
Engine(s): Hispano-Suiza 8A 180 hp V-8
Wingspan: 25 ft 7 in
Length: 20 ft 2 in
Height: 7 ft 6.5 in
Empty Weight: 1,102 lb
Gross Weight: 1,554 lb
Max Speed: 125 mph
Ceiling: 17,500 ft
Endurance: 2.3 hrs
Crew: One
Armament: One Vickers .303 machine gun

The French Air Service replaced the Nieuport 17 with the Spad S.7. Although disadvantaged by poor forward and downward views from the cockpit, the Spad S.7 was fast, durable, and difficult to shoot down. A good performer, it was flown by nearly all the French aces. It proved less successful in the hands of the British, possibly due to the combat tactics employed by the pilots of the Royal Flying Corps.

The highest-scoring ace for the Spad S.7 and Spad S.13 was William Cochran-Patrick, an Irishman, with 18 victories.

Spad S XIII



Manufacturer: Societe Anonyme pour l'Aviation et ses Derives

Introduced: June 1, 1917

Number Built: 8,472

Type: Fighter

Engine(s): Hispano-Suiza 8 Bec 220 hp 8-cylinder water-cooled inline

Wingspan: 26 ft 11 in

Length: 20 ft 8 in

Height: 7 ft 11 in

Gross Weight: 1,801 lb

Max Speed: 138 mph at 6,560 ft

Ceiling: 21,820 ft

Endurance: 2 hrs

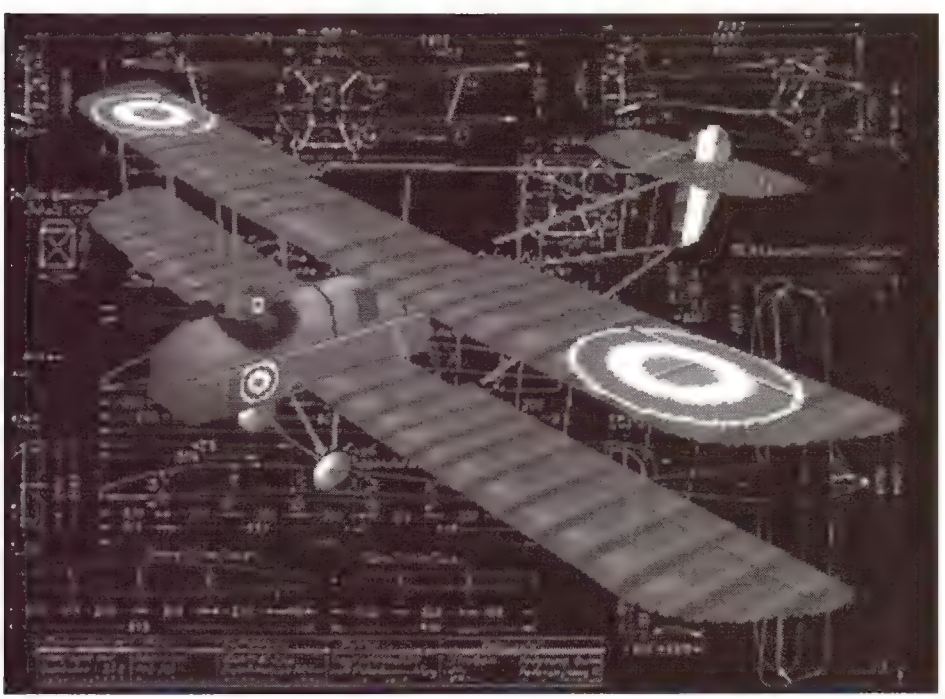
Crew: One

Armament: Two Vickers .303 machine guns

Equipped with twin machine guns and a larger engine, the Spad S.13 was modeled on the smaller Spad S.12. Built in large numbers, it was fast and powerful but difficult to fly.

The Spad S.13 was flown by many famous aces, including Georges Guynemer and Eddie Rickenbacker. The highest-scoring ace for the Spad S.7 and Spad S.13 was William Cochran-Patrick, an Irishman, with 18 victories.

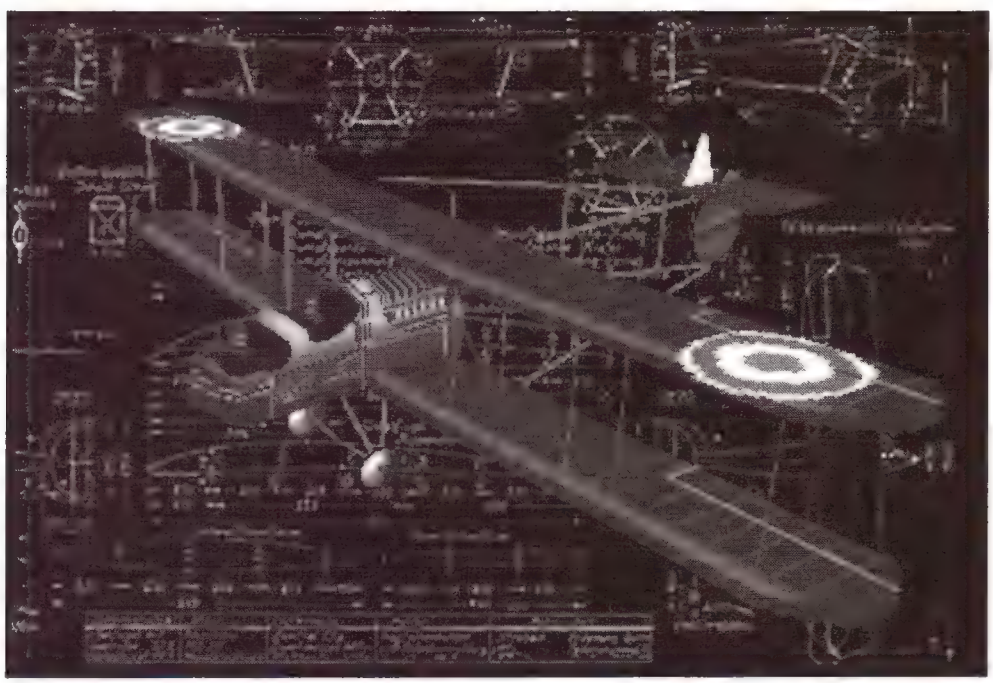
Airco D.H.2



Manufacturer: Airco
Introduced: 1916
Engine(s): Gnome Monosoupape 100 hp rotary pusher
Wingspan: 28 ft 3 in
Weight: 1,441 lb
Max Speed: 93 mph
Ceiling: 14,000 ft
Endurance: 3 hrs
Armament: One machine gun

This aircraft helped put an end to the Fokker Scourge in 1916, but was soon outclassed by faster, more agile fighters.

RAF F.E.2b



Manufacturer: Royal Aircraft Factory

Introduced: 1915

Type: Fighter, reconnaissance

Engine(s): Beardmore 160 hp water-cooled inline

Wingspan: 47 ft 9 in

Weight: 1,289 lb

Max Speed: 91 mph

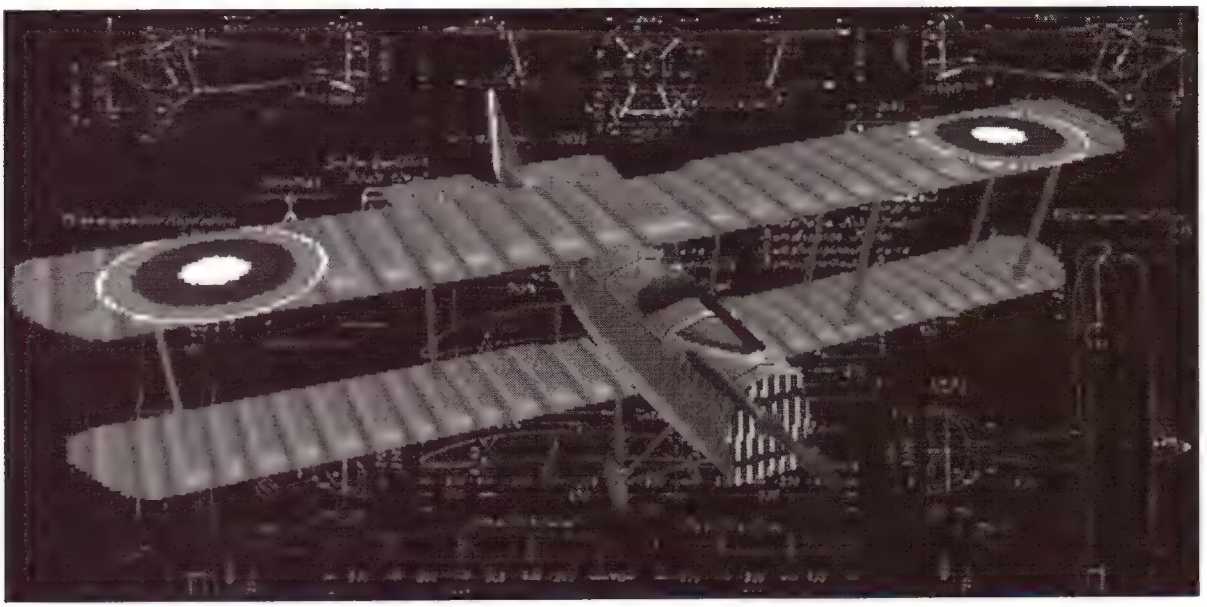
Ceiling: 11,000 ft

Endurance: 2.5 hrs

Armament: Two machine guns

The Royal Aircraft Factory F.E.2 series was a two-seat all-purpose aircraft that saw service throughout the war in fighter, recon, and bomber roles. It was slow, stable, and highly vulnerable to fighter attacks, though it was armed with a pair of Lewis guns. This aircraft was designed as a pusher to solve the problem of shooting through the propeller.

Airco D.H.4

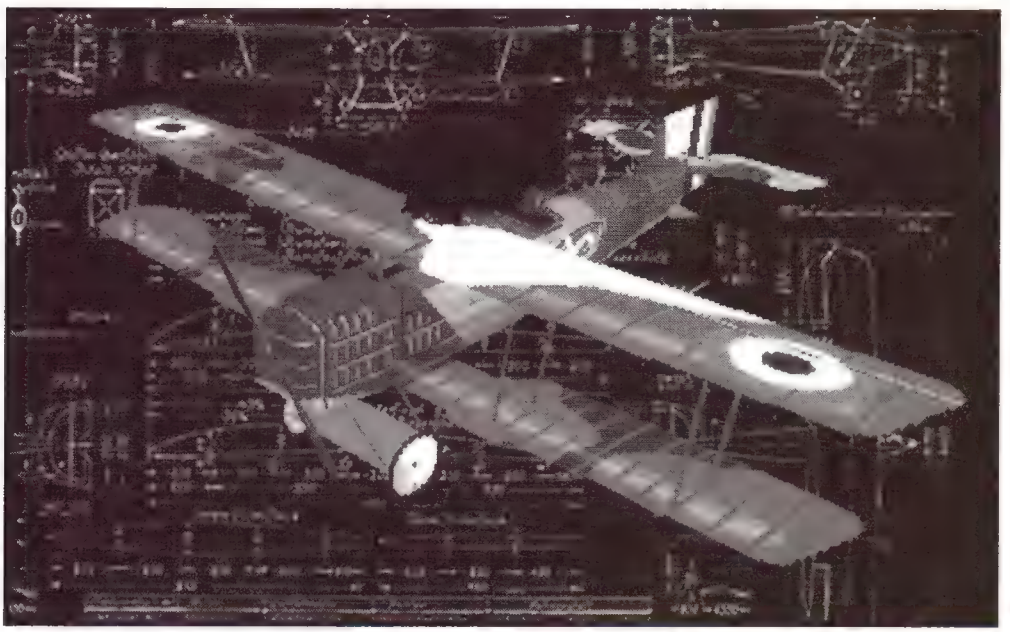


Manufacturer: Airco
Introduced: 1917
Type: Light daytime bomber
Engine(s): Rolls-Royce Eagle VIII 375 hp 12-cylinder water-cooled inline
Wingspan: 42 ft 4 in
Weight: 3,742 lb
Max Speed: 143 mph
Ceiling: 23,500 ft
Endurance: 7 hrs
Armament: Up to four machine guns, 460 lb bombs

Fast and rugged, the DH-4 could carry over 400 pounds of bombs. For defensive armament it carried one or two fixed forward-firing Vickers guns, and

one or two free-firing Lewis guns in the rear cockpit. This aircraft was designed by De Havilland and was used as a daytime bomber. It was flown until 1932.

Breguet Bre. 14 B2



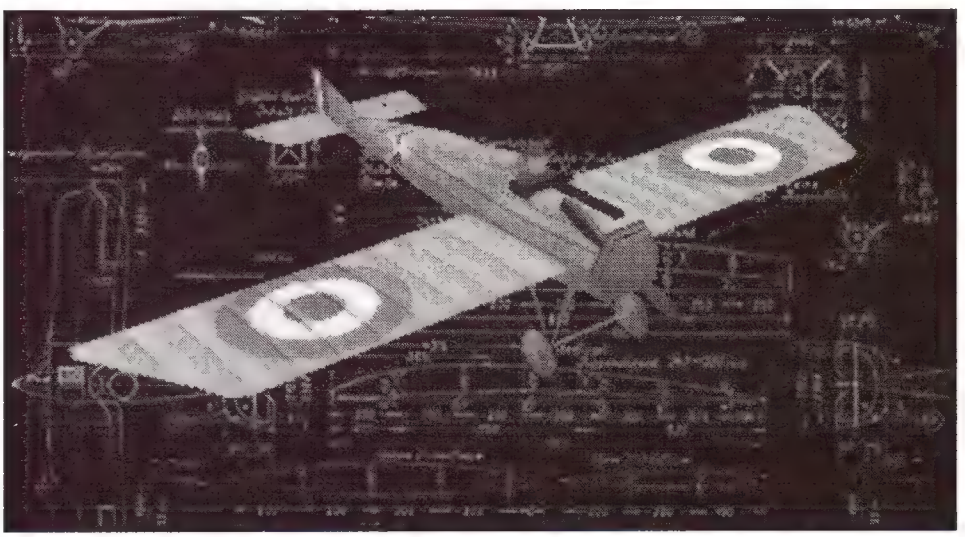
Manufacturer: Breguet
Introduced: 1917
Type: Fast daytime bomber, reconnaissance
Engine(s): Renault Fox 300 hp 12-cylinder water-cooled inline
Wingspan: 47 ft 1 in
Gross Weight: 3,892 lb
Max Speed: 110 mph
Ceiling: 19,030 ft
Endurance: 3 hrs

Crew: Two

Armament: Two machine guns, 661 lb bombs

The Breguet 14 bomber was a tough bomber employed by both French and American air services. Armed with three guns and 500 pounds of bombs, it was one of the best single-engine bombers of the war. It was produced until 1926.

Morane Bullet



Type: Fighter

Engine(s): Le Rhone 9C 80 hp rotary

Wingspan: 26 ft 9 in

Max Speed: 89 mph

Ceiling: 13,123 ft

Crew: One

Armament: One Hotchkiss or Lewis .303 machine gun

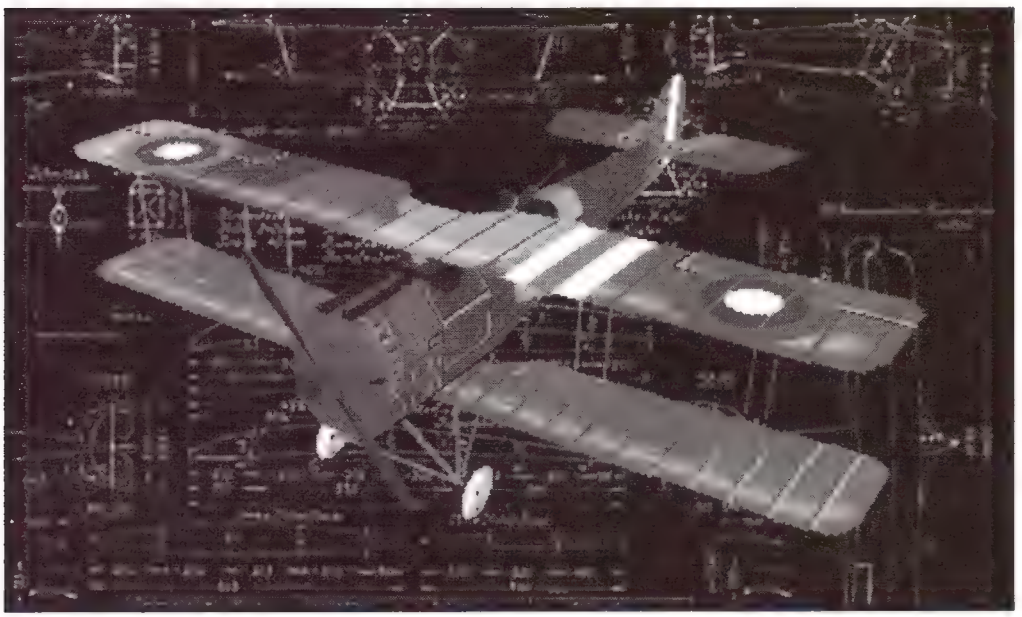
The Morane-Saulnier "Bullet" was a pre-war racing plane pressed into service as a fighter in the early days of 1915. It equipped both French and British squadrons until early 1916. Though fast for its time, it was difficult to fly and not very agile.

Nieuport 24

Manufacturer: Societe Anonyme des Etablissements Nieuport
Type: Fighter
Engine(s): Le Rhone 9J 110 hp rotary
Wingspan: 27 ft
Max Speed: 109 mph
Ceiling: 17,390
Crew: One
Armament: One Lewis or Vickers .303 machine gun

The Nieuport was not a great improvement over the earlier scouts in the series. Some French aces preferred the Nieuport 24's agility over the Spad VII and XIII's durability, but the type soon lost favor in the Air Service and was phased out by early 1918.

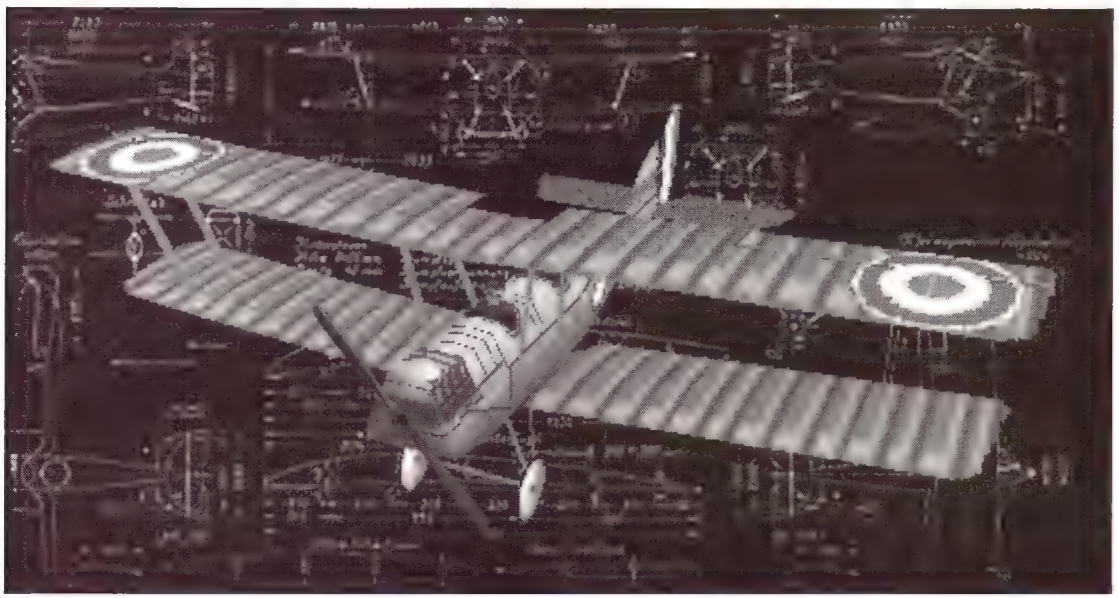
Salmson 2A2



Type: Reconnaissance
Engine(s): Salmson Canton-Unne 260 hp
Wingspan: 38 ft 8 in
Max Speed: 115 mph
Ceiling: 20,505 ft
Crew: Two
Armament: One Vickers machine gun, two Lewis machine guns

The Salmson 2A.2 was a fast and maneuverable two-seater that could absorb considerable punishment. It carried three machine guns, making it one of the most heavily armed Allied planes of the war.

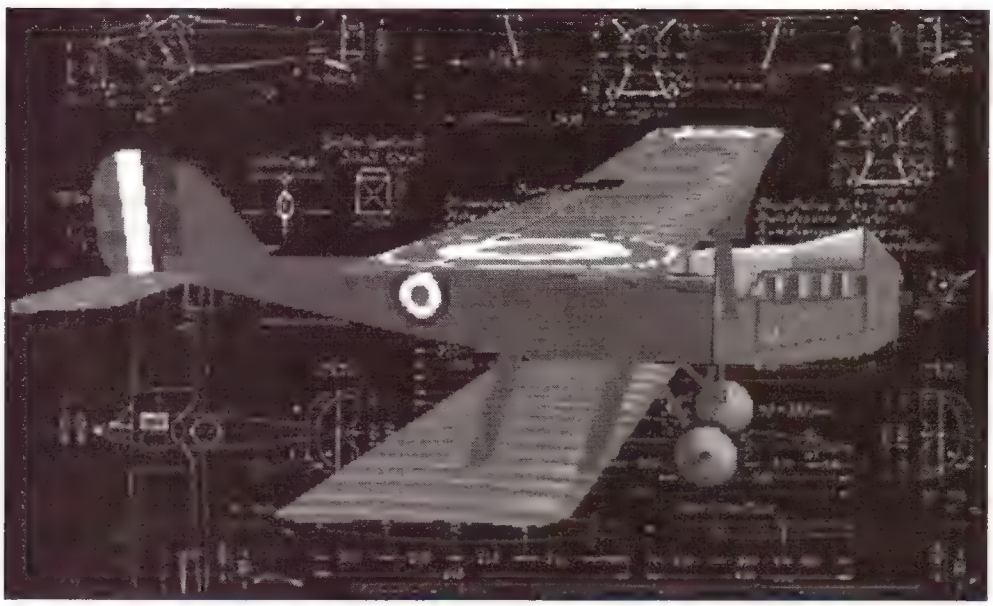
RAF B.E.2



Manufacturer: Royal Aircraft Factory
Type: Reconnaissance
Engine(s): RAF1a 90 hp
Wingspan: 37 ft
Max Speed: 72 mph
Ceiling: 10,000
Crew: Two
Armament: Personal arms

The Royal Aircraft Factory B.E.2 reconnaissance biplane was slow, ungainly and terribly vulnerable. Despite its shortcomings, it served in RFC squadrons throughout the war.

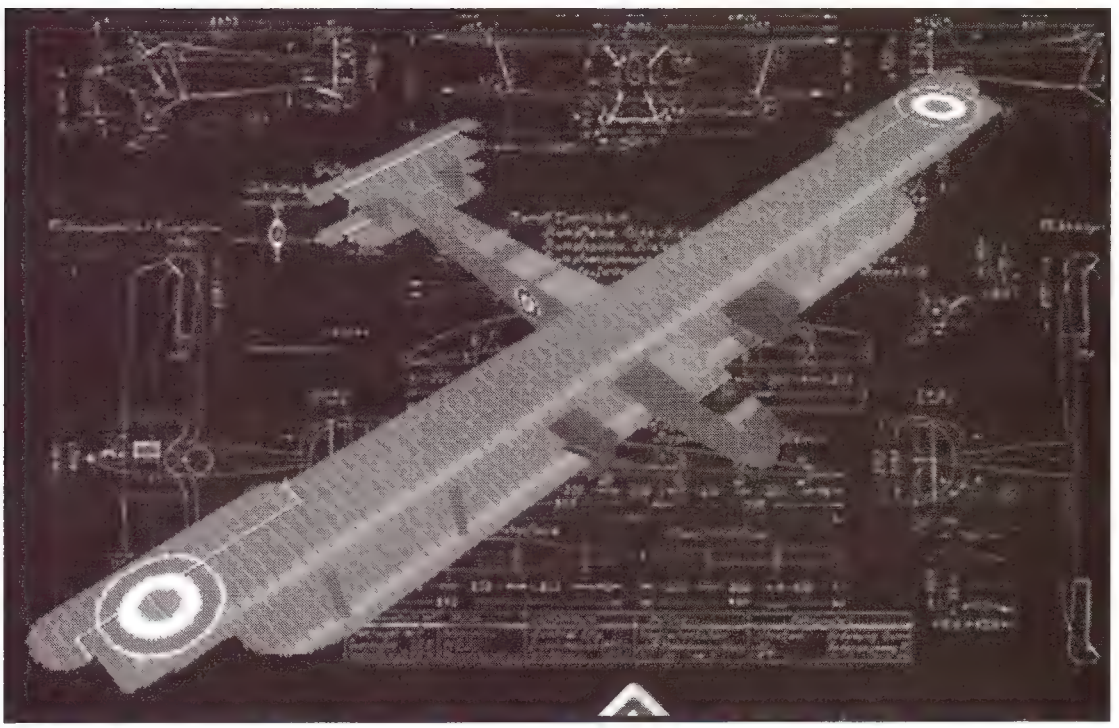
RAF R.E.8



Manufacturer: Royal Aircraft Factory
Type: Reconnaissance
Engine(s): RAF4a 150 hp
Wingspan: 42 ft 7 in
Max Speed: 102 mph
Ceiling: 13,500
Crew: Two
Armament: One Vickers machine gun, one Lewis machine gun

The R.E. 8 served in RFC's recon units from the spring of 1917 until the end of the war despite being a truly miserable aircraft. Prone to catching fire, crews hated the "Harry Tate" as it was slow and vulnerable as well as unreliable.

Handley-Page O/400



Type: Night bomber
Engine(s): Rolls-Royce Eagle VIII 360 hp water-cooled inline
Wingspan: 100 ft
Length: 62.85 ft
Max Speed: 98 mph
Ceiling: 8,500 ft
Endurance: 8.5 hrs

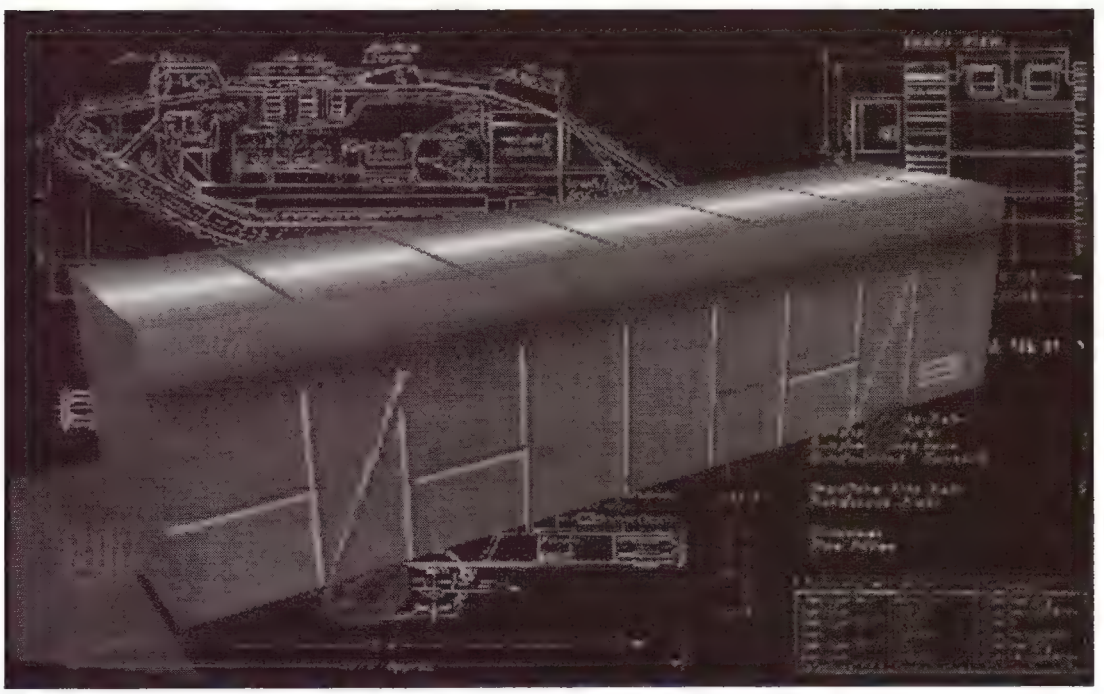
Crew: Four

Armament: Five Lewis .303 machine guns, 3,300 lb (1,497 kg) bombs

The Handley Page 0/400 heavy bomber could carry a one-ton bomb load for over 400 miles, making it the best long-range Allied bomber of the war. The 0/400 was also extremely well-armed, carrying five free-firing Lewis guns.

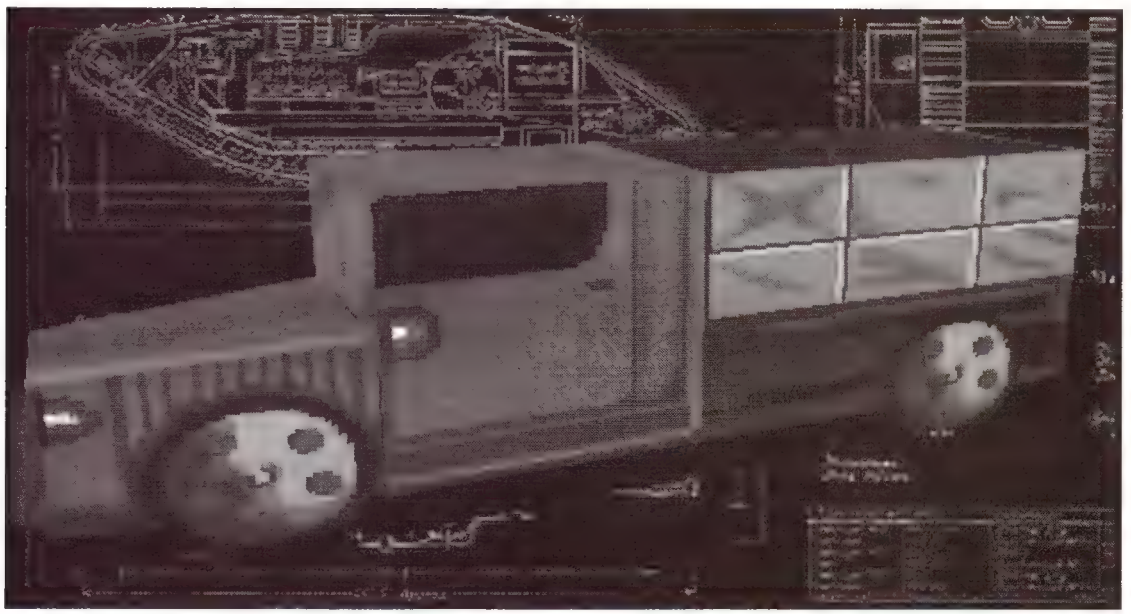
Ground Units

The Boxcar



When attacking trains, make these boxcars the target of your strafing attacks.

Allied Truck

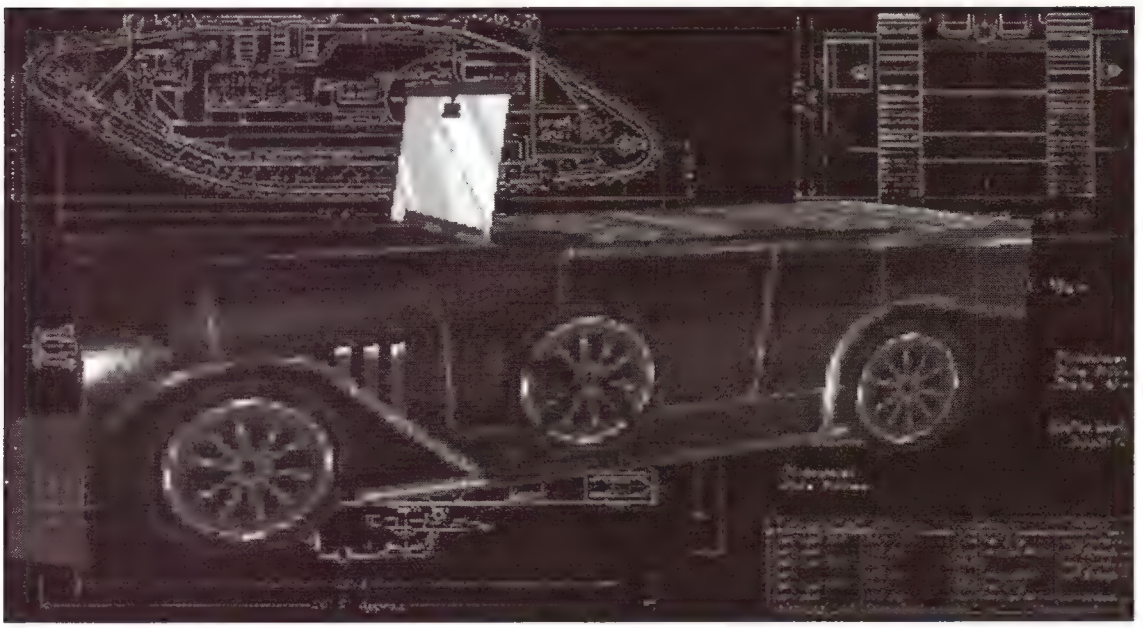


This is an Allied truck. Usually, you will find these in convoys behind the front lines. Since they carry supplies, they are a high priority target on ground strafing missions.

German Truck

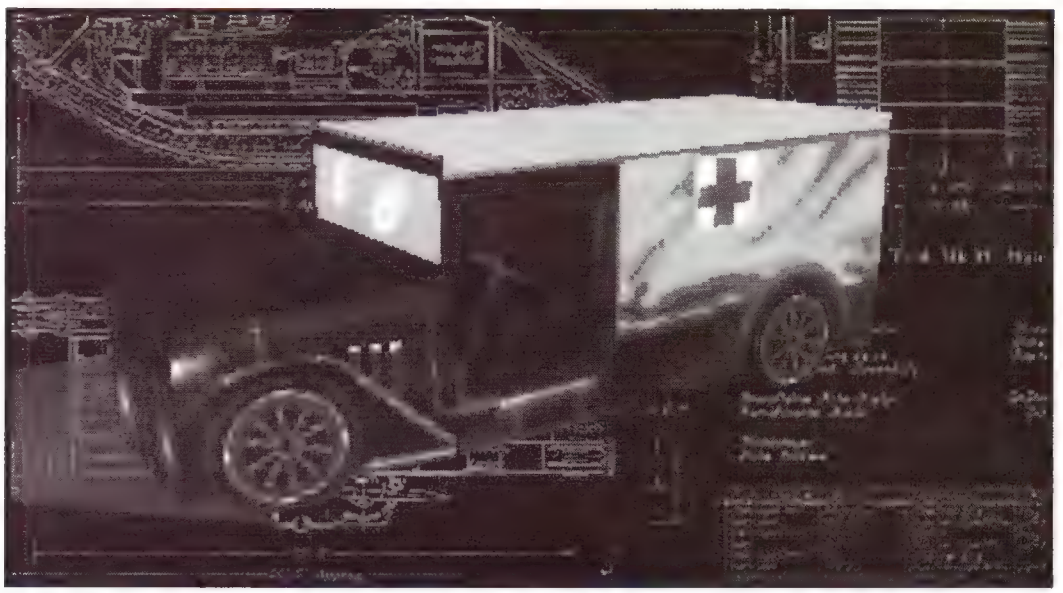
This is a German truck. Usually, you will find these in convoys behind the front lines. Since they carry supplies, they are a high priority target on ground strafing missions.

Staff Car



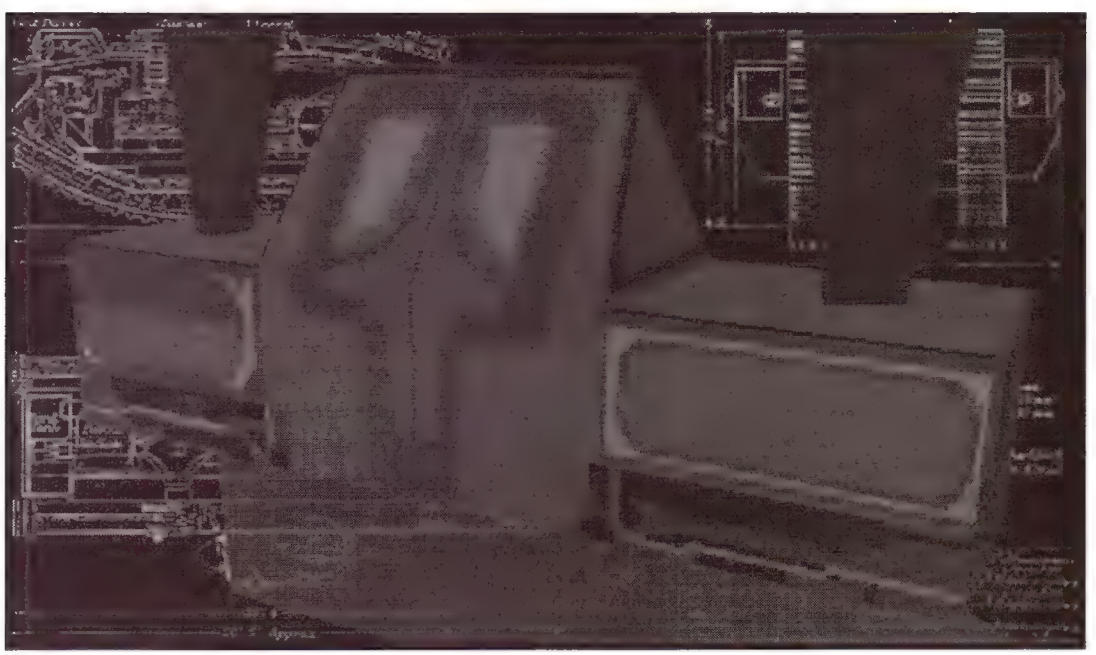
Staff cars are usually found on the roads behind the front lines. They carry high ranking officers and should be attacked on sight.

Ambulance



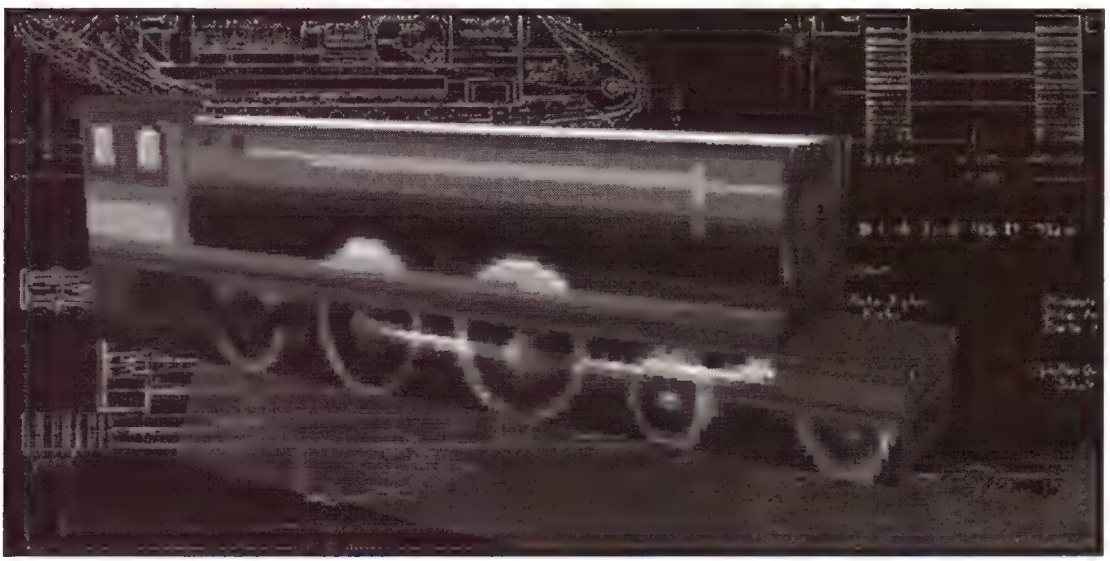
Ambulances can be just behind the front lines. They are protected by international law, so do not, under any circumstances, attack them.

Dual Direction



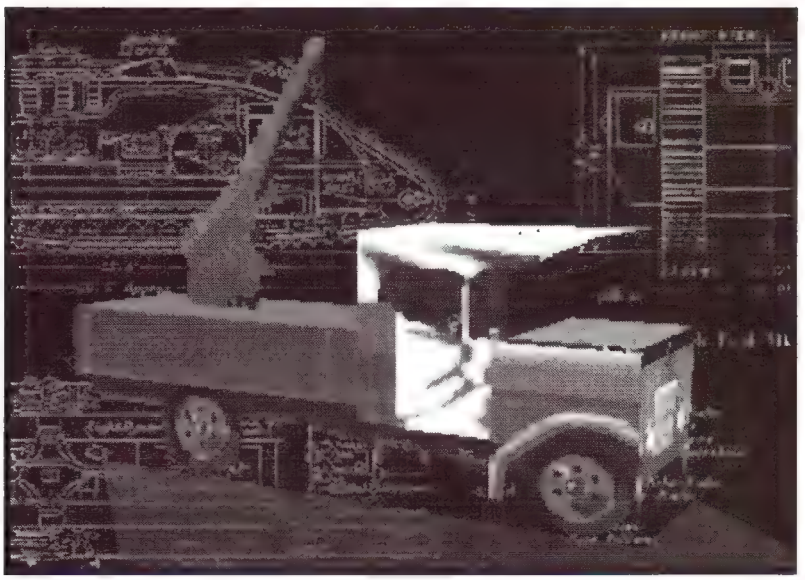
Dual control locomotives are found in rail yards, as they serve as switches. They can also be used as freight carriers. They are tough to destroy, so if you plan on taking one out you had better have a bomb handy.

Locomotive



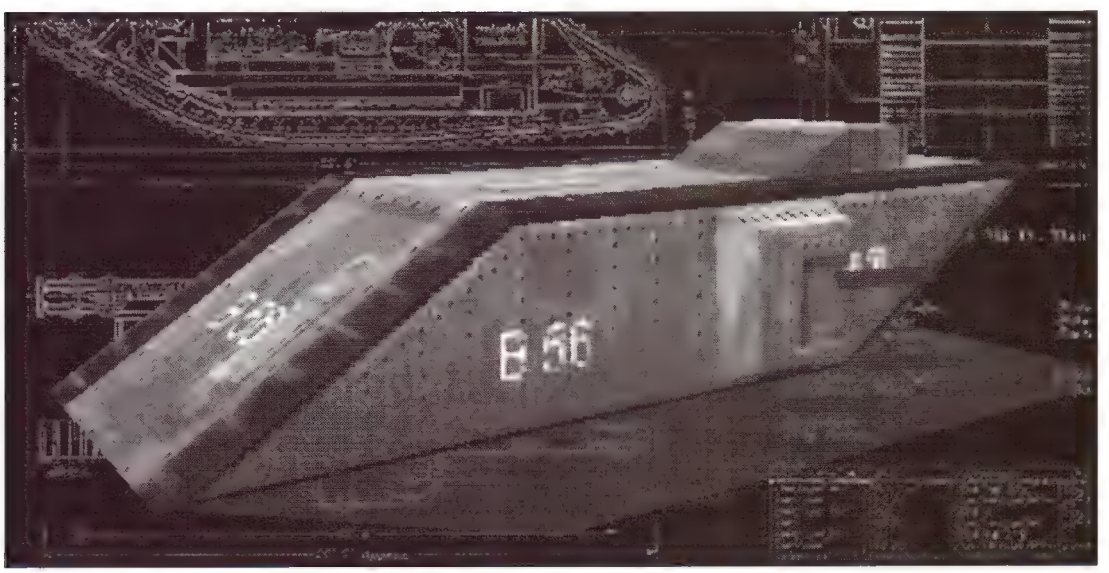
Locomotives are high priority targets. Use bombs and repeated strafing attacks to destroy them.

AA Truck



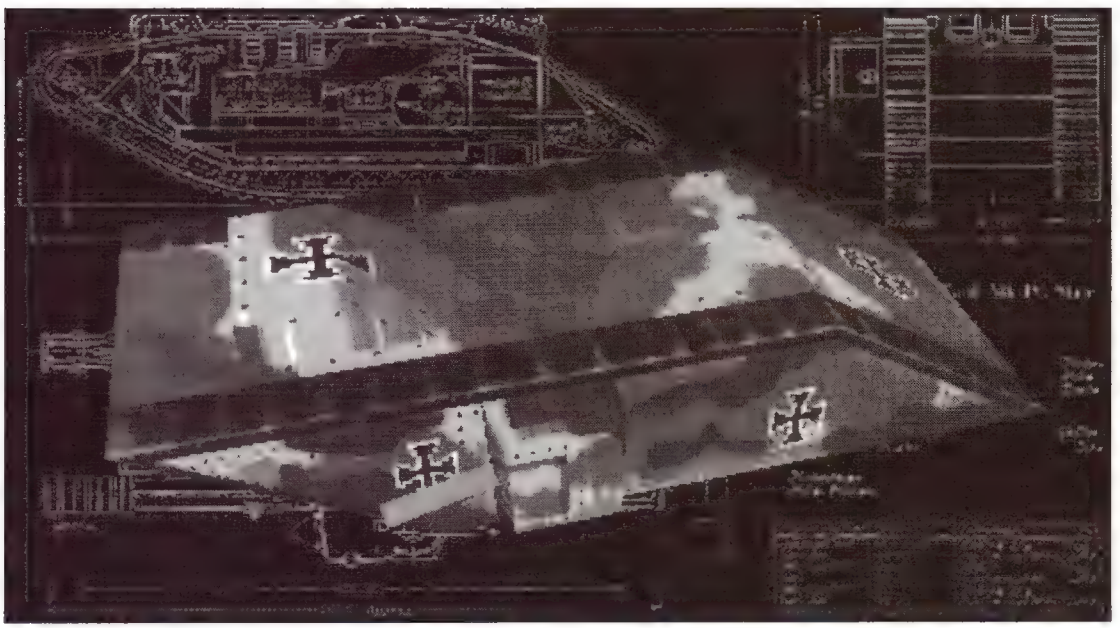
This is a truck with an anti-aircraft gun mounted on its bed. At low altitudes, it can be very dangerous for passing enemy aircraft. Attack these targets quickly and use the terrain to mask your approach.

Large Allied Tank



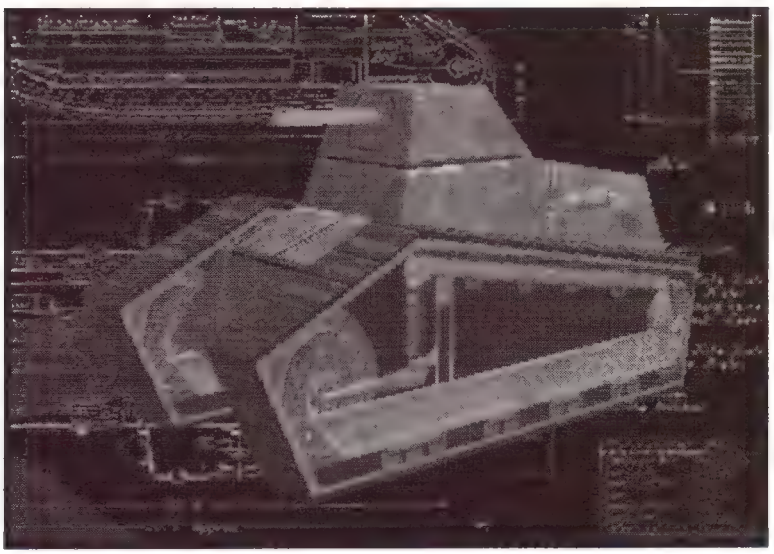
While not posing a serious threat to your aircraft, these are a high priority target that can be dealt with by using an effectively placed bomb.

Large German Tank



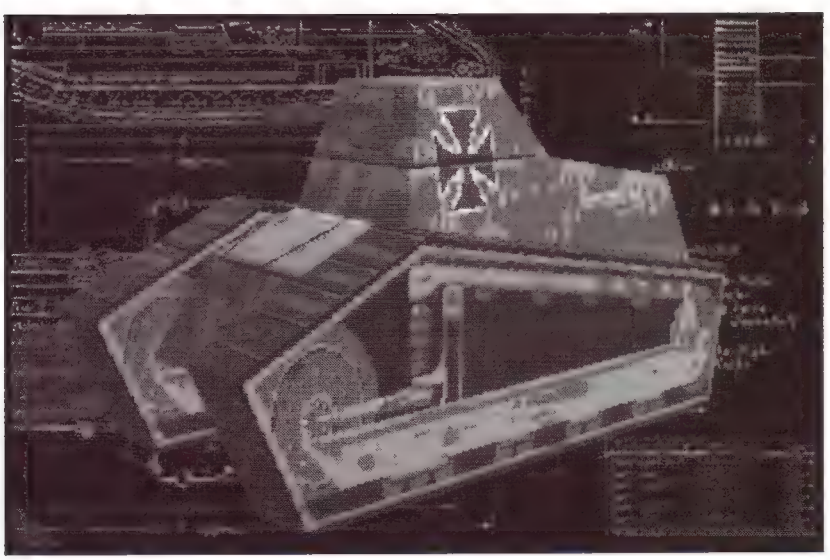
While not posing a serious threat to your aircraft, these are a high priority target that can be dealt with by using an effectively placed bomb.

Small Allied Tank



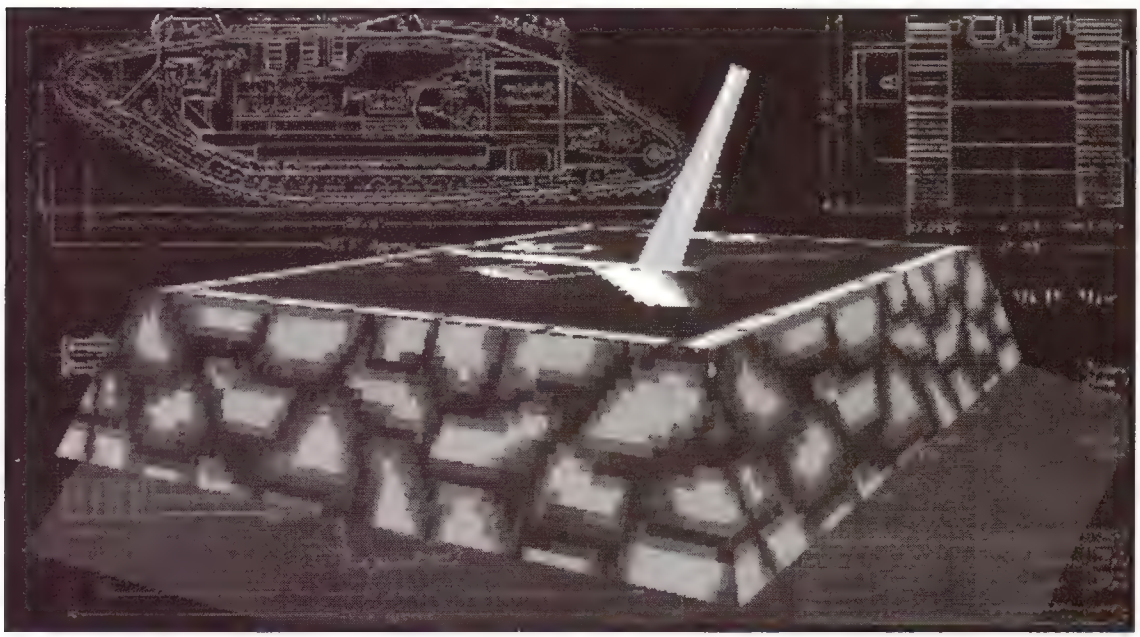
Even less of a threat than their bigger brother, these tanks are still a high priority. They can be punished with a well placed bomb or persistent fire from your machine guns.

Small German Tank



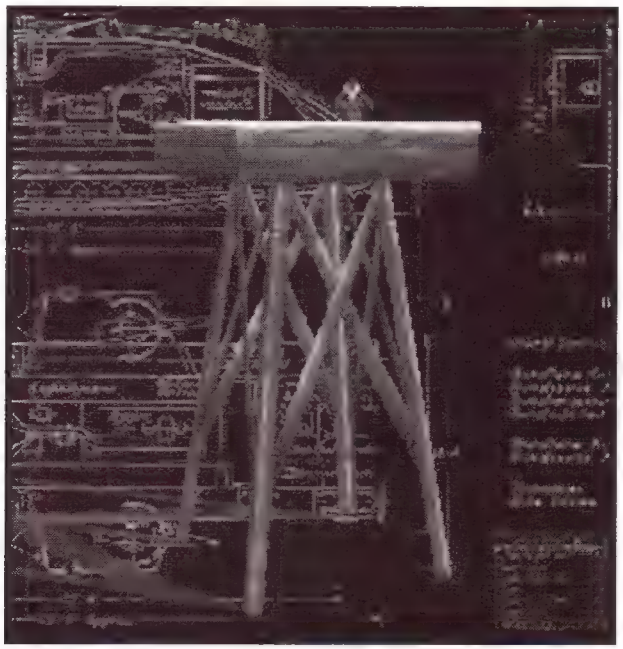
Even less of a threat than their bigger brother, these tanks are still a high priority. They can be punished with a well placed bomb or persistent fire from your machine guns.

German AA Gun



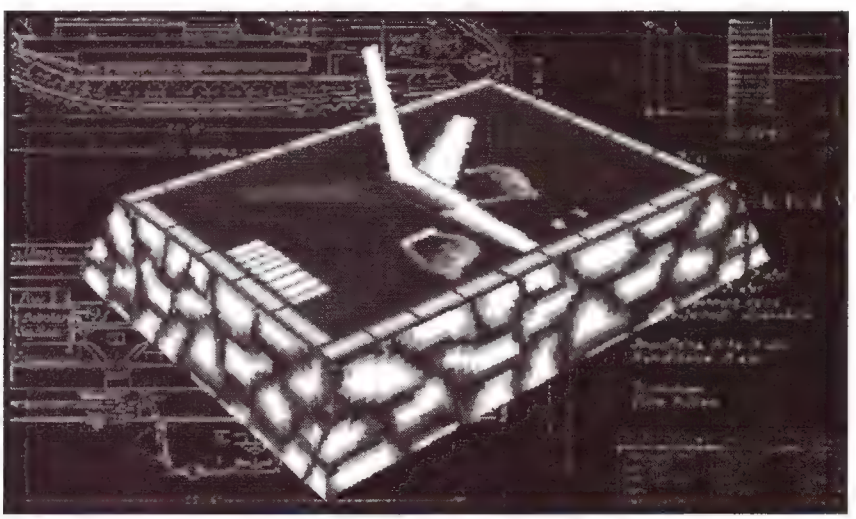
German anti-aircraft emplacements can be deadly to Allied planes. Hit them hard with either bombs or one good strafing run, but be sure to minimize the amount of time you are within range of its guns.

Observation Tower



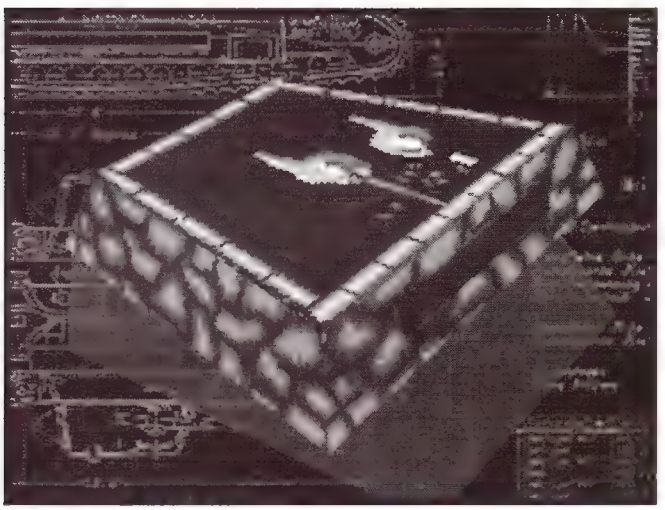
Observation towers can be found around airfields. They are not a threat to aircraft, so make them a low priority target.

Allied AA Gun



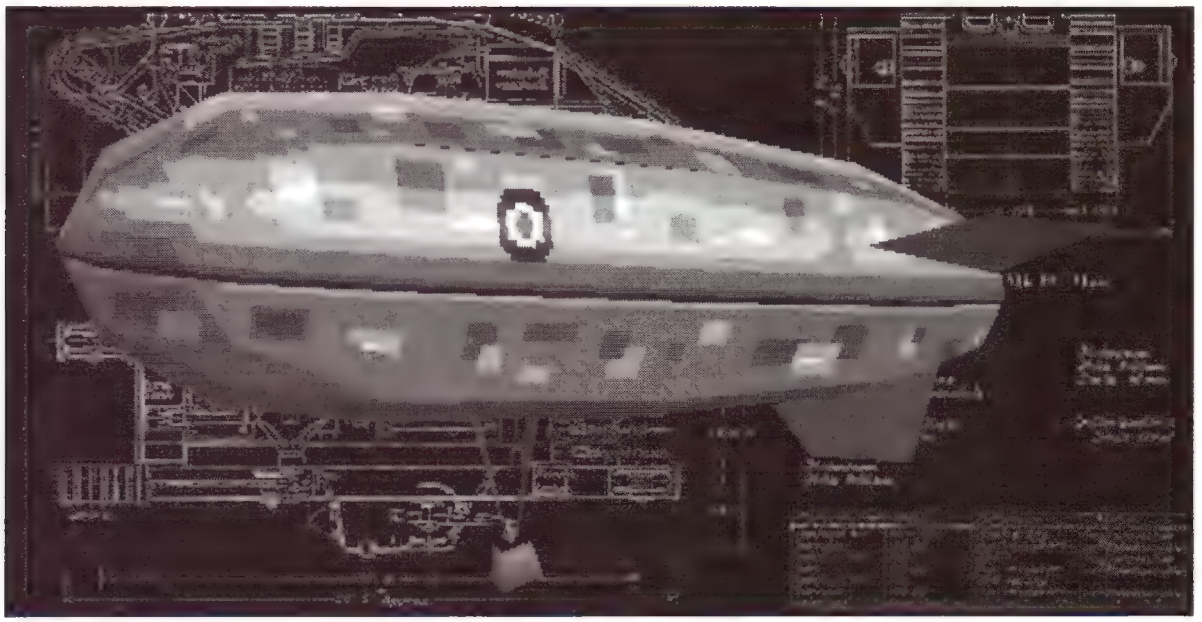
Anti-aircraft emplacements are very dangerous targets. They are found around supply dumps, rail yards and airfields. Knock them out with bombs or one quick strafing run.

German Gun Nest



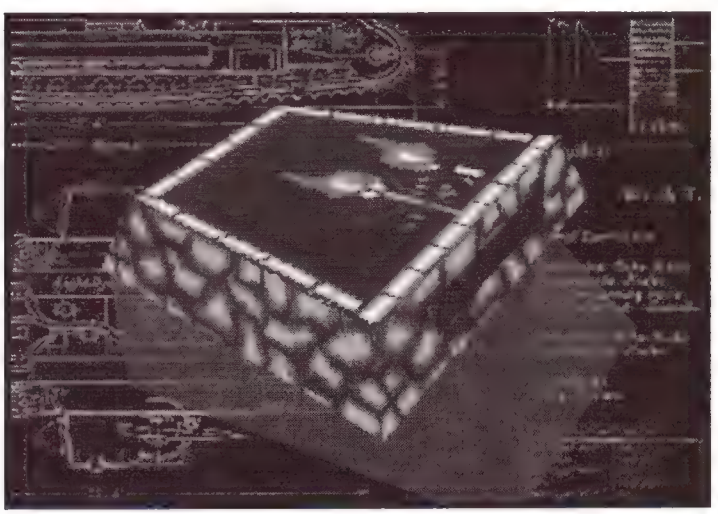
German machine gun nests can be very dangerous to both Allied infantry and aircraft. Take them out to help clear the way for the ground troops, or to wipe out the defenses around an airfield.

Allied Baloon



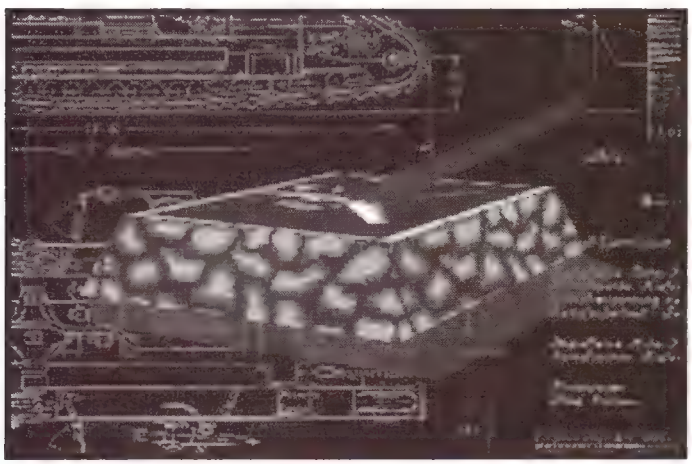
This is an Allied Caquot baloon. It is used to spot artillery fire. As a result, they are a high priority target. Be careful attacking these baloons, as they are well defended by flak and machine guns.

Allied Gun Nest



Allied machine gun nests can be very dangerous to both German infantry and aircraft. Take them out to help clear the way for the ground troops, or to wipe out the defenses around an airfield.

Allied Artillery

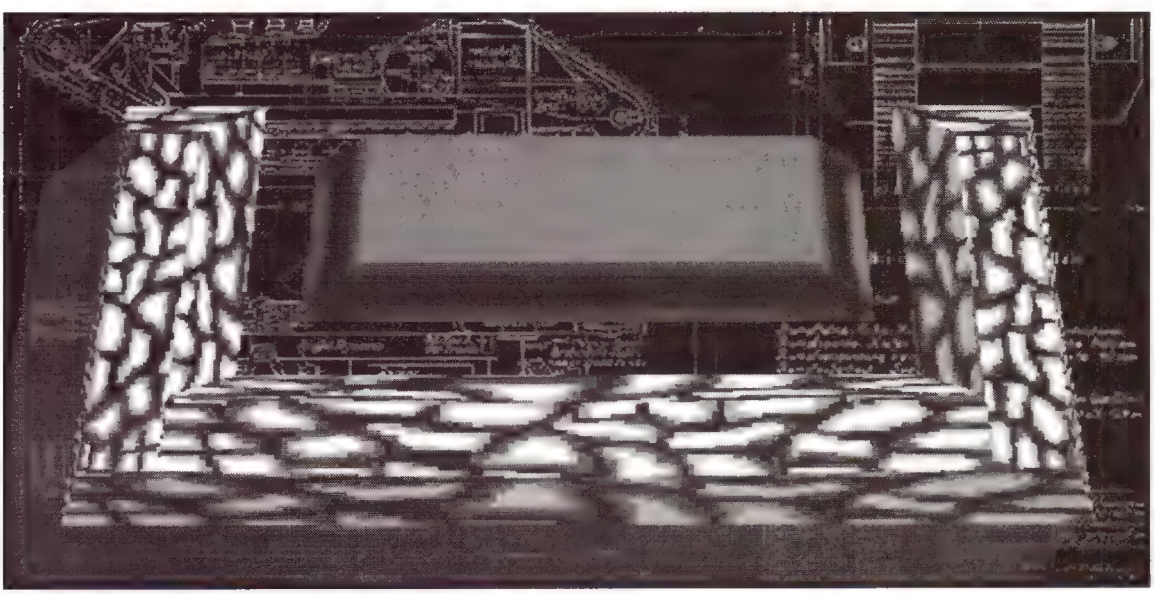


Allied artillery can be found just behind trenches. Strafe and bomb these high priority targets, as they can cause untold damage to friendly troops.

Slit Trench

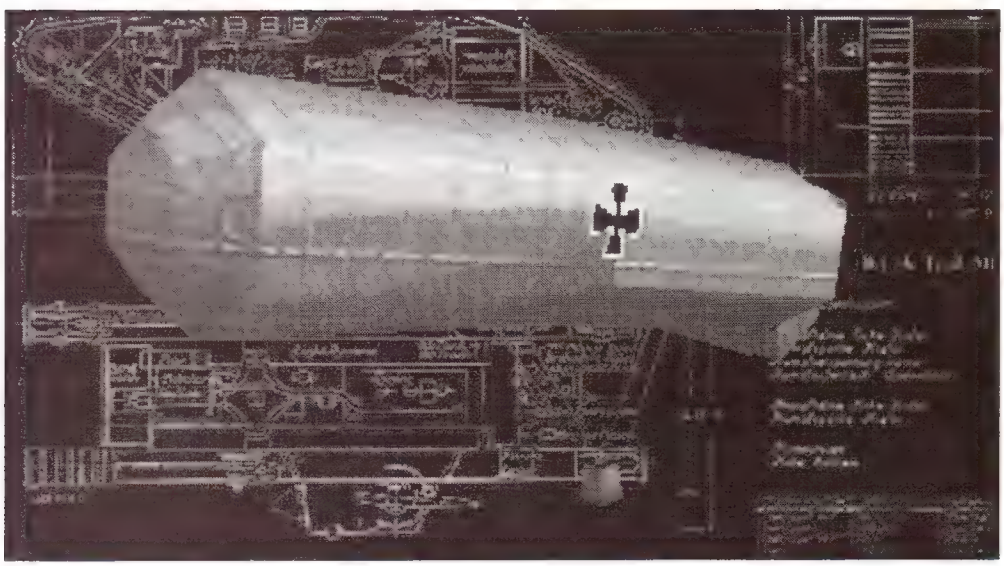
Slit trenches can be found around many targets, including supply dumps and airfields. They are basically harmless, so ignore them and use your ordnance on higher priority targets.

German Observation Point



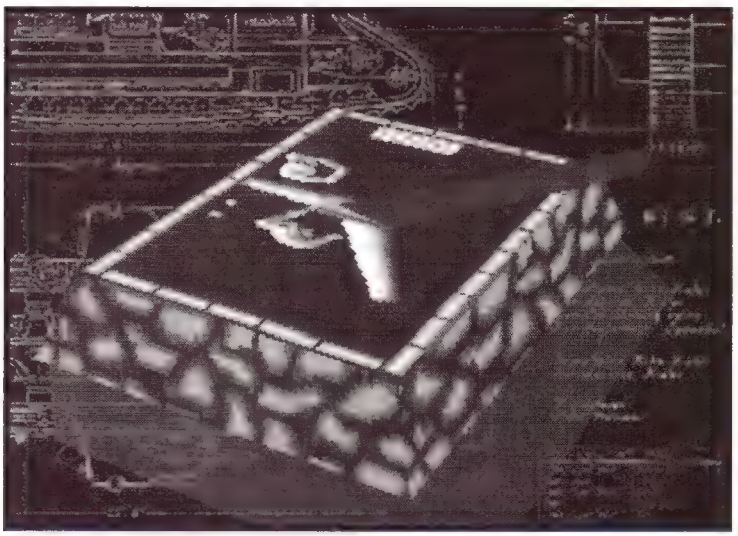
These are German artillery observation points. They can bring a deadly rain of accurate fire down on Allied troops, so bomb and strafe them whenever possible.

German Balloon



This is a German Drachen observation balloon. It is used to spot artillery fire. As a result, they are a high priority target. Be careful attacking these balloons, as they are well defended by flak and machine guns.

German Artillery



Germany artillery can be found just behind trenches. Strafe and bomb these high priority targets, as they can cause untold damage to friendly troops.

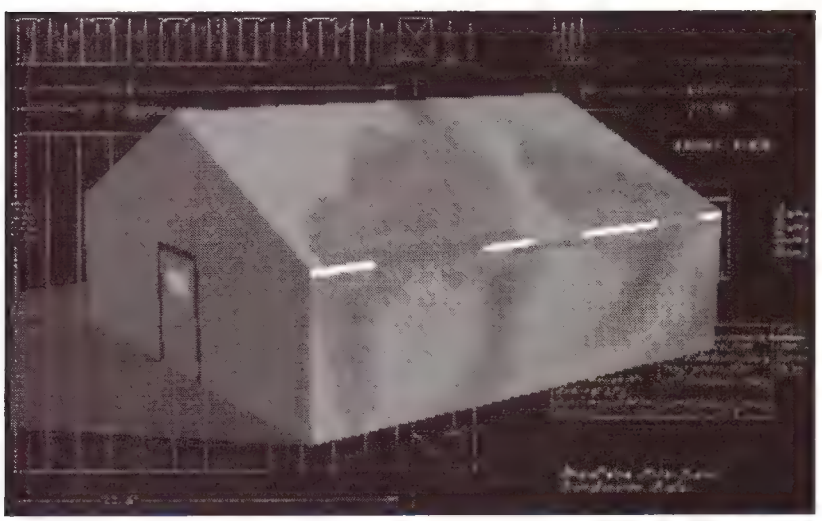
German Soldier

German Soldiers make great strafing targets when out in the open. Bombs can also be very effective in breaking up infantry attacks.

Allied Soldier

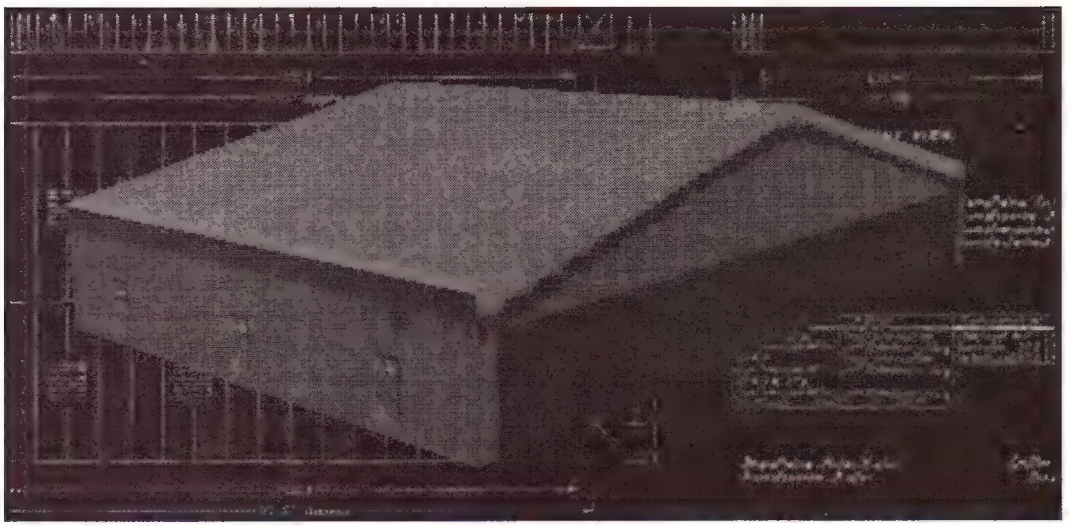
Allied soldiers make great strafing targets when out in the open. Bombs can also be very effective in breaking up infantry attacks.

Green Tent



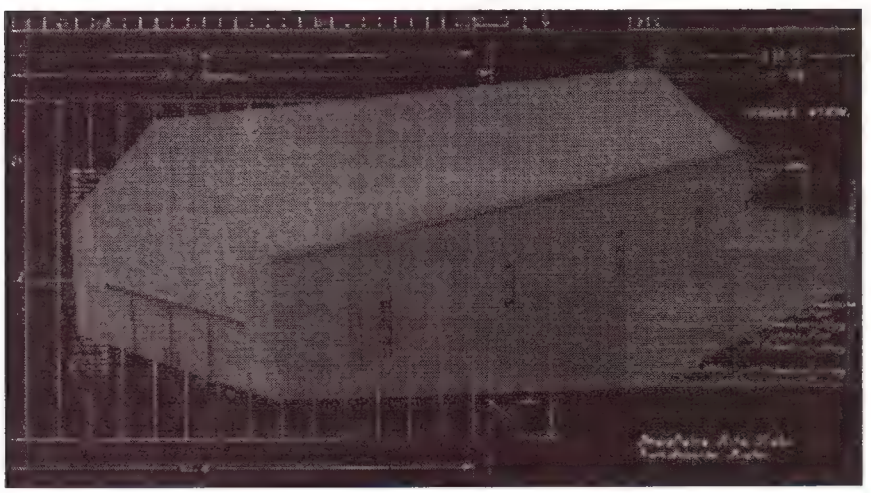
Tents can house either personnel or supplies. Strafe them if there aren't any other better targets nearby.

Large Hanger



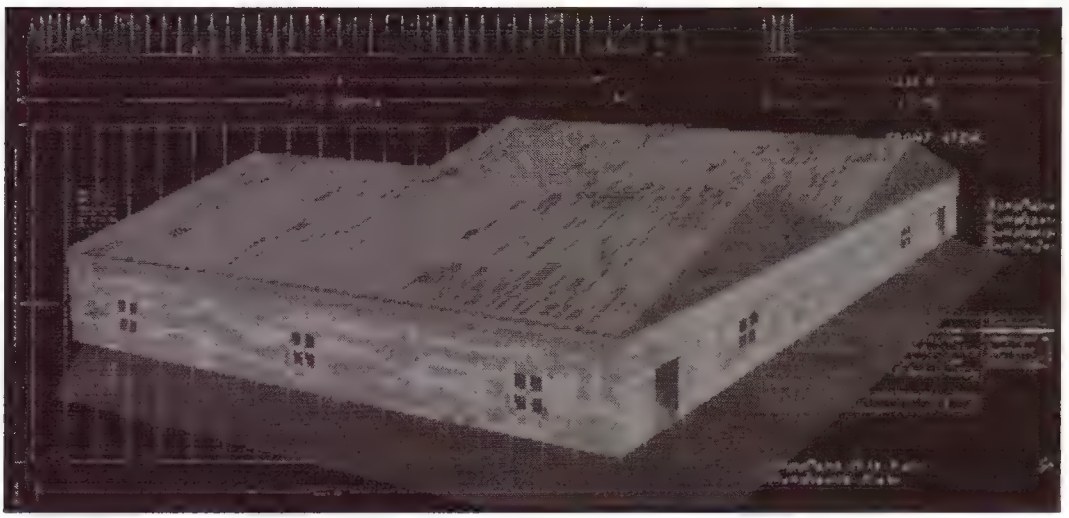
Large hangars house extensive repair facilities. Hit them hard with bombs, and make them high priority targets.

Warehouse

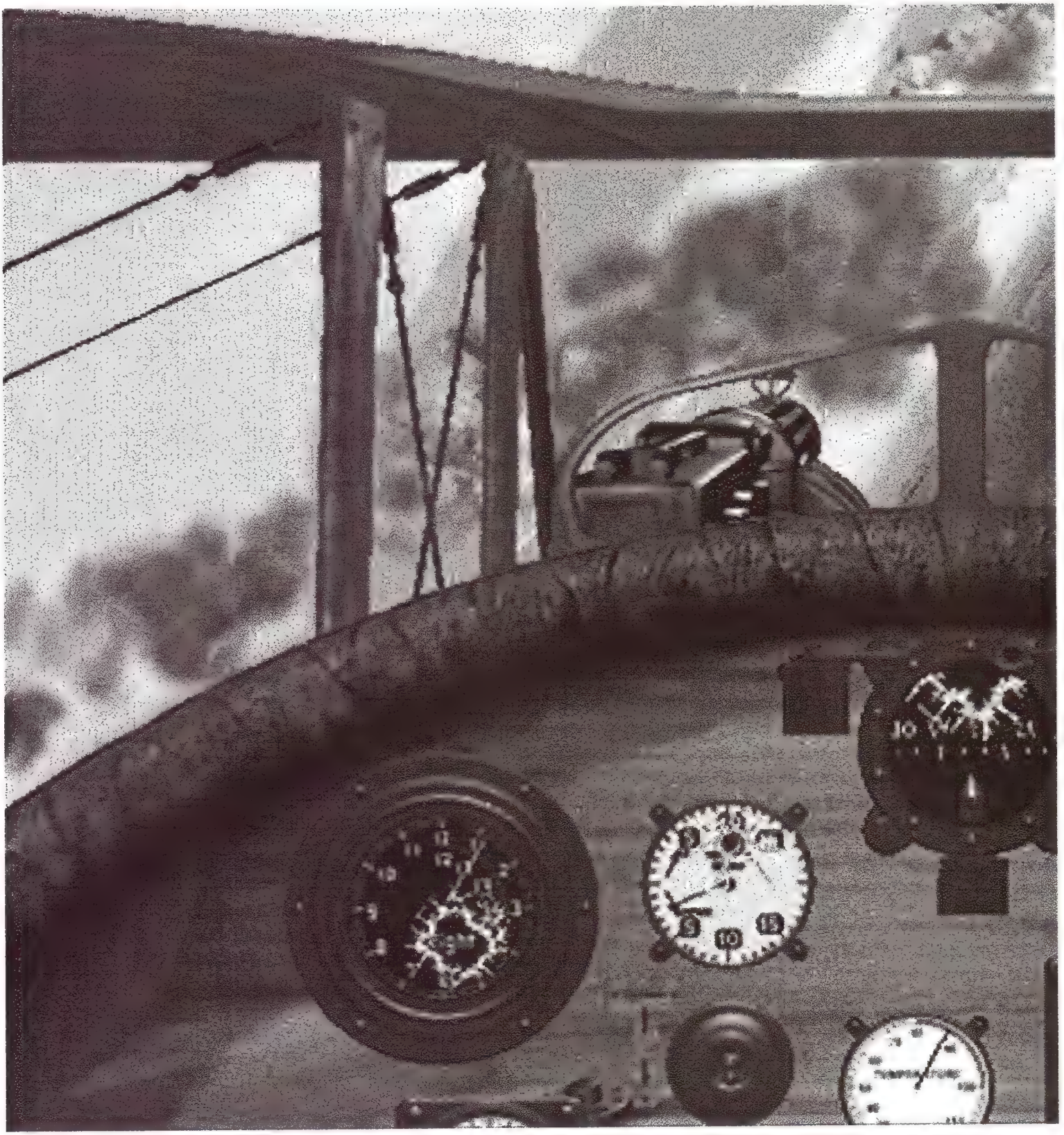


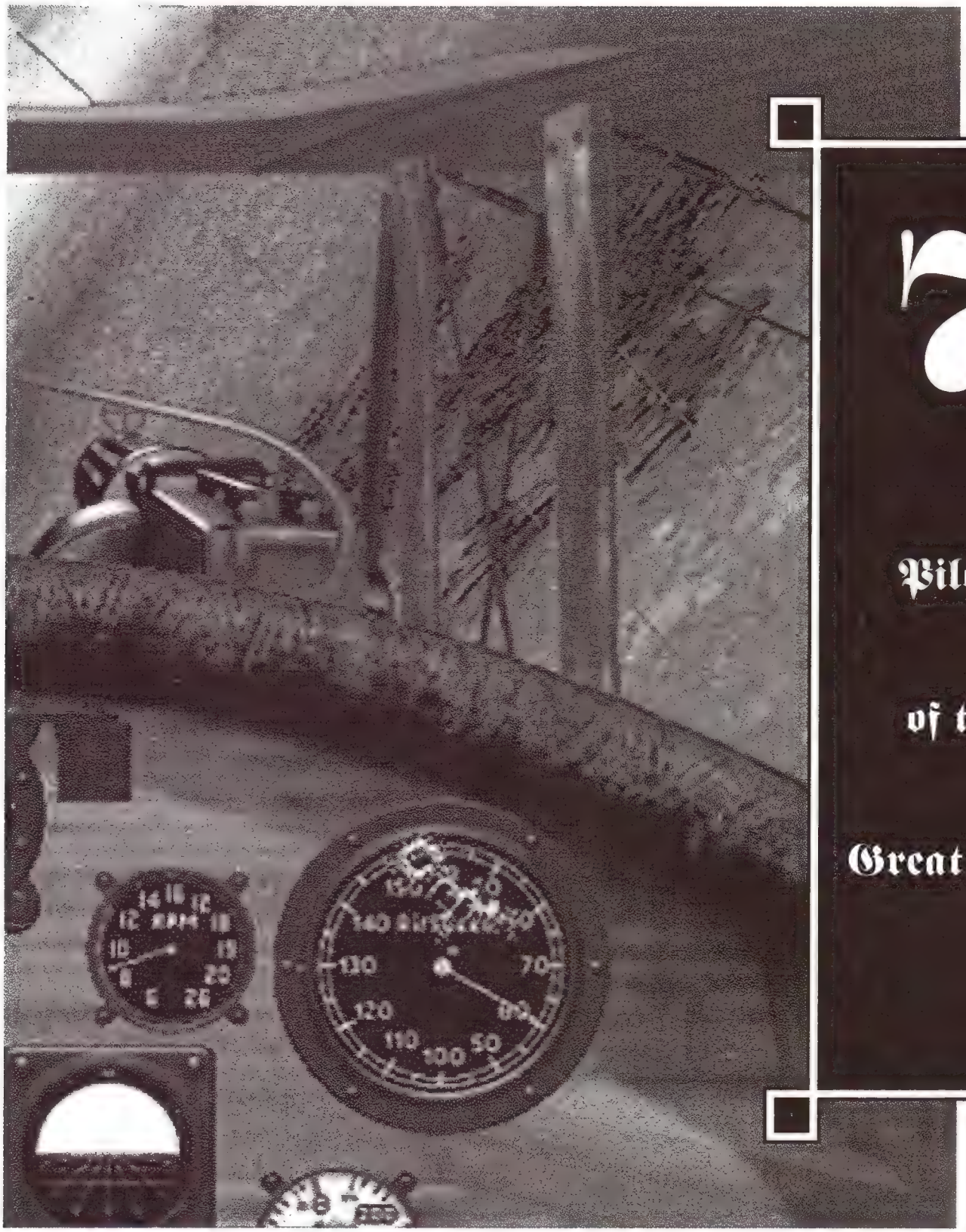
Warehouses can be found at supply dumps. They make good targets for bombs.

Barracks



Barracks contain troops and other personnel. Bomb them whenever possible!





7

Pilots of the Great War

They came from all walks of life. Rich and poor. Lucky and destined for disaster. One thing united pilots on both sides of the conflict, however—flight. It was a new concept, advancing rapidly, and it required a unique breed of person to exploit the virgin technology's strengths and weaknesses. For the most part, pilots made things up as they went, literally flying by the seat of their pants. At the war's early stages, "combat tactics" wasn't even a phrase yet. They were learning. But this all changed.

The following paragraphs describe some notable pilots who flew during the Great War.

Oswald Boelcke

Oswald Boelcke was a pioneer of combat aviation, a supporter of formation flying, and the father of the German Air Service. Boelcke was born in 1891, the son of a humble schoolteacher. He spent several years as an officer in the Telegraphers Battalion before transferring to aviation in June 1914. Boelcke flew unarmed reconnaissance planes with his brother Wilhelm acting as observer.

His first air victory came while behind the stick of an LVG C.I. His aggressiveness was well known: Boelcke was one of only two pilots to fly the

squadron's new Fokker monoplane; the other was old friend and flying partner, Max Immelmann.

Oswald Boelcke was one of the first pilots to push hard for the offensive use of aircraft. When he flew with his partner Immelmann, he discovered that groups of fighter planes were more effective than single units. But it took awhile for the German General Staff to come to terms with this wisdom. It wasn't until after Immelmann's death in June 1916 and the horrors of Verdun that the top generals listened.

Boelcke met with the Kaiser and was ordered to correct the fallacies of the fighter command and reorganize the fighter forces. Boelcke quickly organized Jagdstaffels, hunting squadrons of single-seaters. Each Jasta had 6 planes originally, but as the war dragged on this grew to 21. In September 1916, Boelcke published the doctrine of the German Air Service, the first rules for fighter pilots ever written.

Boelcke took command of Jasta 2, the first squadron equipped solely with fighters. He handpicked his pilots, including Manfred von Richthofen—the Red Baron.

Boelcke died on October 28, 1916 when his plane collided with a fellow pilot's.

Manfred Von Richthofen

Manfred was a born hunter. With a phenomenal eye and steady hand, as a youth he hunted everything from tame ducks to wild boar. Richthofen was

the son of a military officer, and graduated cadet school and the War Academy in Danzig, Poland. In June 1915, Richthofen transferred to flying school in Saxony and soon became an observer. While patrolling in an Aviatik C.I., Richthofen swung his Parabellum machine gun around on a French Farman and shot it down after 100 rounds. In late 1915, Richthofen obtained permission to pursue pilot training.

After a short course at Doberitz and three attempts at the final examination, Richthofen finally received his pilot's certificate. Excited, he urged his brother, Lothar, to follow in his footsteps. While Lothar learned the fundamentals of flight, Manfred arrived at the front in March, 1916—smack in the middle of the Verdun Offensive.

On one occasion, Richthofen jerry-rigged a machine gun to the top of his Albatros C III and shot down a Nieuport scout. Richthofen began his career as a true fighter pilot when he joined the Jasta Boelcke in September of 1916, taking control of an Albatros D.I. single-seat biplane. Richthofen coated sections of his fuselage red for identification, a color that soon gave him the nickname "Red Baron."

Soon Richthofen received the "Blue Max" and full control over his own unit, Jasta 11. Here, Richthofen advanced studies into formation flying and refined group-flying tactics, attaining the same level of respect as his comrade, Oswald Boelcke.

By this time Richthofen was wildly popular, but this fame was nothing compared to the praise he received during "Bloody April," when he scored 21 kills in a single month and was promoted to Rittmeister. And his fame wasn't confined to Germany: The Red Baron was known and feared around the world.

Richthofen and his squadron were known as the "Flying Circus" because of the vibrant colors they used to decorate their planes. Richthofen's Jastas scored more victories and created more aces than any other Jasta in the German Air Service. Illustrating just how lethal the Flying Circus was, it racked up 644 victories with only 52 losses, an astounding 12-to-1 ratio.

For his own part, Richthofen tallied 80 confirmed victories, more than any other pilot during World War I.

Frank Luke, Jr.

Frank Luke, the "Arizona Balloon Buster," was born in Phoenix, Arizona. He enlisted in the U.S. Army in September 1917, learned to fly, and arrived at the front in July 1918. He was assigned to the 27th Aero Sq. His exceptional bravery earned him a reputation for being "wild and reckless," but his fellow pilots soon realized he possessed a characteristic that distinguished great fighter pilots from the others—complete fearlessness.

In September 1918, Luke began a personal campaign against German observation balloons and airplanes. From September 12 through 18—two days of which he didn't fly—he scored 13 confirmed victories, including an amazing five victories (two balloons and three airplanes) on the last day.

At sunset on Sept. 29, 1918, Luke took off from an advance aerodrome at Verdun to attack balloons in the area of Dun-sur-Meuse. He never returned. Following the Armistice, U.S. troops found Luke's grave in the cemetery of the small village of Murvaux. According to the local residents, Luke had been shot in the chest by ground fire while circling Murvaux at low altitude, had landed his SPAD and crawled from it in the gathering dusk, and had died firing his service automatic at German soldiers searching for him along a creek bank. His remains were removed to the U.S. Military Cemetery at Romagne, France, for permanent burial.

On Sept. 29, Luke received the Medal of Honor for shooting down three enemy balloons while under heavy fire both from the ground and from eight pursuing enemy aircraft. He strafed enemy troops, killing six foes.

At the time of his death, Luke was the leading ace of the U.S. Air Service with 18 confirmed victories (14 balloons and 4 airplanes).

Edward V. Rickenbacker

Eddie Rickenbacker of Columbus, Ohio, first gained fame as a race car driver prior to America's entry into WWI. As the U.S. prepared to send its first troops overseas, Rickenbacker was offered the position of chauffeur to General Pershing. He enlisted in the U.S. Army and, after arriving in France, was

transferred to the U.S. Air Service and sent to Tours to learn to fly. He was then made engineering officer at the U.S. flying school at Issoudun because of his unusual knowledge of gasoline engines.

When the first group of newly trained U.S. pilots prepared to leave for the front, Rickenbacker asked to go with them. His request was approved by Major Carl Spaatz and Rickenbacker was assigned to the 94th Aero Squadron.

Almost immediately he demonstrated exceptional combat ability and by the end of the war he was the U.S. forces' leading ace, with 26 confirmed victories, despite the fact that through most of June, July, and August 1918, he had not been permitted to fly combat missions because of severe ear infections. He was appointed by Gen. Billy Mitchell to assume command of the 94th Aero Sq. the day before the Meuse-Argonne offensive began.

On Nov. 6, 1930, President Herbert Hoover awarded the coveted Medal of Honor to Rickenbacker for conspicuous gallantry and intrepidity above and beyond the call of duty in attacking seven enemy airplanes on Sept. 25, 1918, shooting down two. Capt. Rickenbacker passed away Jul. 23, 1973.

Pilot Statistics

What follows is a brief rundown of pilots who scored 20 or more victories during World War I.

Australia

Robert Little

Rank: Captain
Service: Royal Naval Air Service/Royal Air Force
Squadrons: 1W, 8N (RNAS)/203 (RAF)
Victories: 47
Died: May 27, 1918

Roderick Dallas

Rank: Major
Service: Royal Naval Air Service/Royal Air Force
Squadrons: 1N/1W (RNAS)/40 (RAF)
Victories: 32
Died: June 1, 1918

Canada

William Bishop

Rank: Lieutenant Colonel
Service: Royal Flying Corps
Squadrons: 21, 60, 85
Victories: 72
Died: 1956

Raymond Collishaw

Rank: Lieutenant Colonel
Service: Royal Naval Air Service
Squadrons: 3W, 10N, 13N, 47, 203

Victories: 59
Died: 1976

Donald MacLaren

Rank: Major
Service: Royal Flying Corps
Squadrons: 46
Victories: 54
Died: 1989

England

Edward "Milk" Mannock

Rank: Major
Service: Royal Flying Corps
Squadrons: 40, 74, 85
Victories: 60
Died: July 17, 1918

James McCudden

Rank: Major
Service: Royal Flying Corps
Squadrons: 3, 20, 29, 56, 66
Victories: 57
Died: July 11, 1918

Albert Ball

Rank: Captain
Service: Royal Flying Corps
Squadrons: 8, 11, 13, 56, 60
Victories: 44
Died: May 7, 1917

Philip Fullard

Rank: Captain
Service: Royal Flying Corps
Squadrons: 1
Victories 40
Died: November 17, 1917

France

Rene Fonck

Rank: Capitaine
Squadrons: C47, Spa103
Victories: 75
Died: 1953

Georges Guynemer

Rank: Capitaine
Squadrons: Spa3
Victories: 53
Died: September 11, 1917

Charles Nungesser

Rank: Lieutenant
Squadrons: V106, V116, N65, Spa65
Victories: 43
Died: 1927

Georges Madon

Rank: Lieutenant
Squadrons: BL30, MF218, N38, Spa38
Victories: 41
Died: 1924

Maurice Boyau

Rank: Lieutenant
Squadrons: N77, Spa77
Victories: 35
Died: September 16, 1918

Michel Coiffard

Rank: Lieutenant
Squadrons: N154, Spa154
Victories: 34
Died: October 28, 1918

Armand Pinsard

Rank: Capitaine
Squadrons: MS23, N26, N78, Spa23
Victories: 27
Died: June 12, 1917

Rene Dorme

Rank: Sous Lieutenant
Squadrons: C94, CRP, N3
Victories: 23
Died: May 25, 1917

Germany

Manfred von Richthofen

Rank: Rittmeister
Squadrons: FA 69, Jasta 2, 11, JG 1, KG 2
Victories: 80
Died: April 21, 1918

Ernst Udet

Rank: Oberleutnant
Squadrons: FA 68, FFA 206, Jasta 4, 11, 15, 37
Victories: 62
Died: November 17, 1941

Werner Voss

Rank: Leutnant
Squadrons: KG 4, Jasta 2, 5, 10, 14, 29
Victories: 48
Died: September 23, 1917

Fritz Rumey

Rank: Leutnant
Squadrons: FAA 19, Jasta 2, 5
Victories: 45
Died: September 27, 1918

Rudolf Berthold

Rank: Hauptmann
Squadrons: FFA 23, Jasta 4, 14, 18, JG 2
Victories 44
Died: 1920

Bruno Loerzer

Rank: Hauptmann
Squadrons: FA 60, FAA 203, FFA 25, Jasta 17, 26, JG 3, Kek J
Victories: 44
Died: 1960

Paul Baumer

Rank: Leutnant
Squadrons: FA 7, Jasta 2, 5
Victories: 43
Died: 1927

Oswald Boelcke

Rank: Hauptmann
Squadrons: Jasta 2
Victories: 40
Died: October 28, 1916

Lothar von Richthofen

Rank: Oberleutnant
Squadrons: Jasta 11, KG 4
Victories: 40
Died: July 4, 1922

United States

Edward Rickenbacker

Rank: Captain
Services: United States Air Service

Squadrons: 94th Aero
Victories 26
Died: 1973

Appendix

Squadron Locations

When you begin a career in *Red Baron II*, you may select your service, enlistment date, and squadron. Your goals and missions will vary depending on your choices. This section provides information about where each squadron is stationed. This list will come in handy when you've attained a high rank and wish to transfer to a new region.

British Squadrons

In 1916, the British geared up for an offensive move against the Somme. During the first half of 1916, Maj-Gen. Hugh Trenchard expanded and reorganized the RFC into four brigades of two wings each. One brigade was assigned to each army of the BEF. One wing of each brigade was placed under the army headquarters command for strategic use, while the other wing comprised all the squadrons serving the corps commanders for tactical reconnaissance and artillery ranging. Trenchard also moved toward making each squadron more specialized in its purpose and equipment. He called for new fighter types, improved designs, larger numbers, and better pilots. By the time Summer rolled around, Trenchard had managed to expand the RFC to more than 420 aircraft in 27 squadrons placed at the front.

April 1, 1916

Squadron 1: Bailleul Aerodrome in Flanders Region

Squadron 23: Flanders Region

Squadron 24: Flanders Region

Squadron 29: St. Omer Aerodrome in Flanders Region

June 1, 1916

Squadron 1: Bailleul Aerodrome in Flanders Region
Squadron 23: Flanders Region
Squadron 24: Flanders Region
Squadron 29: Abeele Aerodrome in Flanders Region
Squadron 60: Boisdemshen Aerodrome in Flanders Region

August 1, 1916

Squadron 1: Bailleul Aerodrome in Flanders Region
Squadron 23: Flanders Region
Squadron 24: Flanders Region
Squadron 29: Abeele Aerodrome in Flanders Region
Squadron 60: Boisdemshen Aerodrome in Flanders Region

October 1, 1916

Squadron 1: Bailleul Aerodrome in Flanders Region
Squadron 23: Flanders Region
Squadron 24: Flanders Region
Squadron 29: Abeele Aerodrome in Flanders Region
Squadron 40: Treizennes Aerodrome in Flanders Region
Squadron 60: Flanders Region

December 1, 1916

Squadron 1: Bailleul Aerodrome in Flanders Region
Squadron 23: Flanders Region
Squadron 24: Flanders Region
Squadron 29: Flanders Region
Squadron 40: Treizennes Aerodrome in Flanders Region
Squadron 46: Droglandt Aerodrome in Flanders Region

Squadron 60: Flanders Region
8 RNAS: St. Pol sur Mere Aerodrome in Flanders Region

January 1, 1917

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Teteghem Aerodrome in Flanders Region
Squadron 23: Flanders Region
Squadron 24: Flanders Region
Squadron 29: Flanders Region
Squadron 40: Treizennes Aerodrome in Flanders Region
Squadron 46: Droglandt Aerodrome in Flanders Region
Squadron 54: Flanders Region
Squadron 60: Flanders Region
8 RNAS: St. Pol sur Mere Aerodrome in Flanders Region

March 1, 1917

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Leffrinckhauke Aerodrome in Flanders Region
Squadron 23: Flanders Region
Squadron 24: Flanders Region
Squadron 29: Flanders Region
Squadron 40: Treizennes Aerodrome in Flanders Region
Squadron 43: Treizennes Aerodrome in Flanders Region
Squadron 46: Droglandt Aerodrome in Flanders Region
Squadron 54: Flanders Region
Squadron 60: Flanders Region
8 RNAS: St. Pol sur Mere Aerodrome in Flanders Region

May 1, 1917

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Flanders Region

Squadron 23: Flanders Region
Squadron 24: Flanders Region
Squadron 29: Flanders Region
Squadron 40: Flanders Region
Squadron 43: Treizennes Aerodrome in Flanders Region
Squadron 46: Boisdemshen Aerodrome in Flanders Region
Squadron 54: Flanders Region
Squadron 56: St. Omer Aerodrome in Flanders Region
Squadron 60: Flanders Region
8 RNAS: Flanders Region

July 1, 1917

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Bailleul Aerodrome in Flanders Region
Squadron 23: La Lovie Aerodrome in Flanders Region
Squadron 24: Flanders Region
Squadron 29: Flanders Region
Squadron 40: Flanders Region
Squadron 43: Flanders Region
Squadron 46: La Gorgue Aerodrome in Flanders Region
Squadron 54: Bray Dunes Aerodrome in Flanders Region
Squadron 56: Flanders Region
Squadron 60: Flanders Region
8 RNAS: Flanders Region

September 1, 1917

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Bailleul Aerodrome in Flanders Region
Squadron 23: La Lovie Aerodrome in Flanders Region
Squadron 24: Flanders Region
Squadron 29: Poperinghe Aerdodrome in Flanders Region
Squadron 40: Flanders Region

Squadron 43: Flanders Region
Squadron 46: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 54: Leffrinckhauke Aerodrome in Flanders Region
Squadron 56: Flanders Region
Squadron 60: Flanders Region
8 RNAS: Flanders Region

November 1, 1917

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Bailleul Aerodrome in Flanders Region
Squadron 23: La Lovie Aerodrome in Flanders Region
Squadron 24: Teteghem Aerodrome in Flanders Region
Squadron 28: Flanders Region
Squadron 29: Poperinghe Aerdodrome in Flanders Region
Squadron 40: Flanders Region
Squadron 43: Flanders Region
Squadron 46: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 54: Teteghem Aerodrome in Flanders Region
Squadron 56: Flanders Region
Squadron 60: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 65: La Lovie Aerodrome in Flanders Region
8 RNAS: Flanders Region
Squadron 84: Flanders Region

January 1, 1918

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Bailleul Aerodrome in Flanders Region
Squadron 23: La Lovie Aerodrome in Flanders Region
Squadron 24: Flanders Region
Squadron 28: Flanders Region
Squadron 29: Poperinghe Aerdodrome in Flanders Region
Squadron 40: Flanders Region

Squadron 43: Flanders Region
Squadron 46: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 54: Flanders Region
Squadron 56: Flanders Region
Squadron 60: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 65: Bailleul Aerodrome in Flanders Region
8 RNAS: Flanders Region
Squadron 84: Flanders Region

March 1, 1918

Squadron 1: Bailleul Aerodrome in Flanders Region
1 RNAS: Teteghem Aerodrome in Flanders Region
Squadron 23: Matigny Aerodrome in Marne Region
Squadron 24: Matigny Aerodrome in Marne Region
Squadron 28: Flanders Region
Squadron 29: Poperinghe Aerdodrome in Flanders Region
Squadron 40: Flanders Region
Squadron 43: La Gorgue Aerodrome in Flanders Region
Squadron 46: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 54: Flanders Region
Squadron 56: Flanders Region
Squadron 60: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 65: Poperinghe Aerdodrome in Flanders Region
8 RNAS: Bray Dunes Aerodrome in Flanders Region
Squadron 84: Flanders Region

May 1, 1918

Squadron 1: Clairmarias Aerodrome in Flanders Region
1 RNAS: Coxyde Aerodrome in Flanders Region
Squadron 203: Flanders Region
Squadron 208: Teteghem Aerodrome in Flanders Region
Squadron 209: Flanders Region

Squadron 23: Moreuil Aerodrome in Marne Region
Squadron 24: Flanders Region
Squadron 28: Flanders Region
Squadron 29: St. Omer Aerodrome in Flanders Region
Squadron 40: Flanders Region
Squadron 43: Flanders Region
Squadron 46: St. Marie Cappelle Aerodrome in Flanders Region
Squadron 54: Clairmarias Aerodrome in Flanders Region
Squadron 56: Flanders Region
Squadron 60: Flanders Region
Squadron 65: Flanders Region
Squadron 74: Clairmarias Aerodrome in Flanders Region
8 RNAS: Teteghem Aerodrome in Flanders Region
Squadron 84: Flanders Region

July 1, 1918

Squadron 1: Clairmarias Aerodrome in Flanders Region
1 RNAS: Coxyde Aerodrome in Flanders Region
Squadron 203: Flanders Region
Squadron 208: Flanders Region
Squadron 209: Flanders Region
Squadron 23: Moreuil Aerodrome in Marne Region
Squadron 24: Flanders Region
Squadron 28: Flanders Region
Squadron 29: Flanders Region
Squadron 40: Flanders Region
Squadron 43: Flanders Region
Squadron 46: Flanders Region
Squadron 54: Flanders Region
Squadron 56: Flanders Region
Squadron 60: Flanders Region
Squadron 65: Flanders Region
Squadron 74: Clairmarias Aerodrome in Flanders Region

8 RNAS: Teteghem Aerodrome in Flanders Region
Squadron 84: Flanders Region
Squadron 85: Petite Synthe Aerodrome in Flanders Region

September 1, 1918

Squadron 1: Flanders Region
1 RNAS: Flanders Region
Squadron 203: Flanders Region
Squadron 208: Flanders Region
Squadron 209: Flanders Region
Squadron 23: Moreuil Aerodrome in Marne Region
Squadron 24: Flanders Region
Squadron 28: Flanders Region
Squadron 29: Hoog Huys Aerodrome in Flanders Region
Squadron 40: Flanders Region
Squadron 43: Flanders Region
Squadron 46: Flanders Region
Squadron 54: Flanders Region
Squadron 56: Flanders Region
Squadron 60: Flanders Region
Squadron 65: Bray Dunes Aerodrome in Flanders Region
Squadron 74: Clairmarias Aerodrome in Flanders Region
8 RNAS: Teteghem Aerodrome in Flanders Region
Squadron 84: Flanders Region
Squadron 85: Petite Synthe Aerodrome in Flanders Region

November 1, 1918

Squadron 1: Flanders Region 1 RNAS: Flanders Region
Squadron 203: Flanders Region
Squadron 208: Flanders Region
Squadron 209: Flanders Region

Squadron 23: Moreuil Aerodrome in Marne Region
Squadron 24: Flanders Region
Squadron 28: Flanders Region
Squadron 29: La Lovie Aerodrome in Flanders Region
Squadron 40: Flanders Region
Squadron 43: Flanders Region
Squadron 46: Flanders Region
Squadron 54: Flanders Region
Squadron 56: Flanders Region
Squadron 60: Flanders Region
Squadron 65: Bray Dunes Aerodrome in Flanders Region
Squadron 74: La Lovie Aerodrome in Flanders Region
8 RNAS: Teteghem Aerodrome in Flanders Region
Squadron 84: Flanders Region
Squadron 85: Petite Synthe Aerodrome in Flanders Region

German Squadrons

October 1, 1916

Jasta 10: Flanders Region
Jasta 11: Flanders Region
Jasta 12: Laon Aerodrome in Marne Region
Jasta 13: Alsace Region
Jasta 14: Alsace Region
Jasta 15: Alsace Region
Jasta 16: Alsace Region
Jasta 2: Flanders Region
Jasta 4: La Ferte Chevresis Aerodrome in Marne Region
Jasta 5: Verdun Region
Jasta 6: Verdun Region
Jasta 7: Verdun Region
Jasta 8: Roulers Aerodrome in Flanders Region

December 1, 1916

Jasta 10: Flanders Region
Jasta 11: Flanders Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Alsace Region
Jasta 15: Alsace Region
Jasta 16: Alsace Region
Jasta 2: Flanders Region
Jasta 22: Vaux Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 4: La Ferte Chevresis Aerodrome in Marne Region
Jasta 5: Verdun Region
Jasta 6: Verdun Region
Jasta 7: Bellevue Aerodrome in Marne Region
Jasta 8: Roulers Aerodrome in Flanders Region

January 1, 1917

Jasta 10: Flanders Region
Jasta 11: Flanders Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Alsace Region
Jasta 15: Alsace Region
Jasta 16: Alsace Region
Jasta 19: Alsace Region
Jasta 2: Flanders Region
Jasta 22: Vaux Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 4: Bellevue Aerodrome in Marne Region
Jasta 5: Flanders Region

Jasta 6: Verdun Region
Jasta 7: Bellevue Aerodrome in Marne Region
Jasta 8: Roulers Aerodrome in Flanders Region

March 1, 1917

Jasta 10: Courtrai Aerodrome in Flanders Region
Jasta 11: Flanders Region
Jasta 12: Alsace Region
Jasta 13: Alsace Region
Jasta 14: Alsace Region
Jasta 15: Alsace Region
Jasta 16: Alsace Region
Jasta 18: Halluin Aerodrome in Flanders Region
Jasta 19: Alsace Region
Jasta 2: Flanders Region
Jasta 22: Vaux Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 26: Alsace Region
Jasta 27: Alsace Region
Jasta 29: Flanders Region
Jasta 30: Bachy Aerodrome in Flanders Region
Jasta 32: Alsace Region
Jasta 34: Verdun Region
Jasta 4: Bellevue Aerodrome in Marne Region
Jasta 5: Flanders Region
Jasta 6: Verdun Region
Jasta 7: Bellevue Aerodrome in Marne Region
Jasta 8: Roulers Aerodrome in Flanders Region

May 1, 1917

Jasta 10: Courtrai Aerodrome in Flanders Region
Jasta 11: Flanders Region

Jasta 12: Alsace Region
Jasta 13: Alsace Region
Jasta 14: Marchais Aerodrome in Marne Region
Jasta 15: Flanders Region
Jasta 16: Alsace Region
Jasta 18: Marcke Aerodrome in Flanders Region
Jasta 19: Pomacle Aerodrome in Marne Region
Jasta 2: Flanders Region
Jasta 22: Vaux Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 26: Flanders Region
Jasta 27: Flanders Region
Jasta 29: Flanders Region
Jasta 30: Bachy Aerodrome in Flanders Region
Jasta 32: Chery les Pouilly Aerodrome in Marne Region
Jasta 34: Verdun Region
Jasta 37: Alsace Region
Jasta 4: Flanders Region
Jasta 5: Flanders Region
Jasta 6: Verdun Region
Jasta 7: Verdun Region
Jasta 8: Roulers Aerodrome in Flanders Region

July 1, 1917

Jasta 10: Heule Aerodrome in Flanders Region
Jasta 11: Bavichove Aerodrome in Flanders Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Marchais Aerodrome in Marne Region
Jasta 15: Flanders Region
Jasta 16: Verdun Region
Jasta 18: Marcke Aerodrome in Flanders Region
Jasta 19: Alsace Region

Jasta 2: Flanders Region
Jasta 22: Vivaise Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 26: Rumbeke Aerodrome in Flanders Region
Jasta 27: Rumbeke Aerodrome in Flanders Region
Jasta 29: Flanders Region
Jasta 30: Bachy Aerodrome in Flanders Region
Jasta 32: Flanders Region
Jasta 34: Verdun Region
Jasta 37: Alsace Region
Jasta 4: Cuerne Aerodrome in Flanders Region
Jasta 5: Flanders Region
Jasta 6: Bisseghem Aerodrome in Flanders Region
Jasta 7: Verdun Region
Jasta 8: Rumbeke Aerodrome in Flanders Region

September 1, 1917

Jasta 10: Heule Aerodrome in Flanders Region
Jasta 11: Bavichove Aerodrome in Flanders Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Marchais Aerodrome in Marne Region
Jasta 15: Flanders Region
Jasta 16: Verdun Region
Jasta 18: Marcke Aerodrome in Flanders Region
Jasta 19: Alsace Region
Jasta 2: Varsenaire Aerodrome in Flanders Region
Jasta 22: Vivaise Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 26: Rumbeke Aerodrome in Flanders Region
Jasta 27: Rumbeke Aerodrome in Flanders Region
Jasta 29: Flanders Region
Jasta 30: Bachy Aerodrome in Flanders Region

Jasta 32: Flanders Region
Jasta 34: Verdun Region
Jasta 37: Flanders Region
Jasta 4: Cuerne Aerodrome in Flanders Region
Jasta 40: Verdun Region
Jasta 5: Flanders Region
Jasta 6: Bisseghem Aerodrome in Flanders Region
Jasta 7: Ingelmunster Aerodrome in Flanders Region
Jasta 8: Rumbeke Aerodrome in Flanders Region

November 1, 1917

Jasta 10: Heule Aerodrome in Flanders Region
Jasta 11: Bavichove Aerodrome in Flanders Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Marchais Aerodrome in Marne Region
Jasta 15: Flanders Region
Jasta 16: Pomacle Aerodrome in Marne Region
Jasta 18: Flanders Region
Jasta 19: Alsace Region
Jasta 2: Rumbeke Aerodrome in Flanders Region
Jasta 22: Vivaise Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 26: Heule Aerodrome in Flanders Region
Jasta 27: Heule Aerodrome in Flanders Region
Jasta 29: Flanders Region
Jasta 30: Bachy Aerodrome in Flanders Region
Jasta 32: Flanders Region
Jasta 34: Cuirieux Aerodrome in Marne Region
Jasta 35: Cuirieux Aerodrome in Marne Region
Jasta 37: Wynghene Aerodrome in Flanders Region
Jasta 4: Cuerne Aerodrome in Flanders Region

Jasta 40: Verdun Region
Jasta 5: Flanders Region
Jasta 6: Bisseghem Aerodrome in Flanders Region
Jasta 7: Ingelmunster Aerodrome in Flanders Region
Jasta 8: Jabbecke Aerodrome in Flanders Region

January 1, 1918

Jasta 10: Flanders Region
Jasta 11: Flanders Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Marchais Aerodrome in Marne Region
Jasta 15: Flanders Region
Jasta 16: Verdun Region
Jasta 18: Flanders Region
Jasta 19: Alsace Region
Jasta 2: Bavichove Aerodrome in Flanders Region
Jasta 22: Vivaise Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 26: Marcke Aerodrome in Flanders Region
Jasta 27: Marcke Aerodrome in Flanders Region
Jasta 29: Flanders Region
Jasta 30: Bachy Aerodrome in Flanders Region
Jasta 32: Flanders Region
Jasta 34: Verdun Region
Jasta 35: Verdun Region
Jasta 37: Wynghene Aerodrome in Flanders Region
Jasta 4: Flanders Region
Jasta 40: Verdun Region
Jasta 43: Verdun Region
Jasta 49: Templevue Aerodrome in Flanders Region
Jasta 5: Flanders Region

Jasta 6: Flanders Region
Jasta 7: Ingelmunster Aerodrome in Flanders Region
Jasta 76: Alsace Region
Jasta 77: Alsace Region
Jasta 8: Alsace Region

March 1, 1918

Jasta 10: Flanders Region
Jasta 11: Flanders Region
Jasta 12: La Ferte Chevresis Aerodrome in Marne Region
Jasta 13: Alsace Region
Jasta 14: Flanders Region
Jasta 15: Flanders Region
Jasta 16: Aertrycke Aerodrome in Flanders Region
Jasta 18: Flanders Region
Jasta 19: La Ferte Chevresis Aerodrome in Marne Region
Jasta 2: Marcke Aerodrome in Flanders Region
Jasta 22: Vivaise Aerodrome in Marne Region
Jasta 23: Verdun Region
Jasta 26: Marcke Aerodrome in Flanders Region
Jasta 27: Marcke Aerodrome in Flanders Region
Jasta 29: Flanders Region
Jasta 30: Templevue Aerodrome in Flanders Region
Jasta 32: Flanders Region
Jasta 34: Verdun Region
Jasta 35: Verdun Region
Jasta 37: Wynghene Aerodrome in Flanders Region
Jasta 4: Flanders Region
Jasta 40: Verdun Region
Jasta 43: Verdun Region
Jasta 46: Templevue Aerodrome in Flanders Region
Jasta 49: Flanders Region

Jasta 5: Flanders Region
Jasta 50: Marchais Aerodrome in Marne Region
Jasta 56: Flanders Region
Jasta 57: Bisseghem Aerodrome in Flanders Region
Jasta 58: Flanders Region
Jasta 6: Flanders Region
Jasta 60: Verdun Region
Jasta 61: La Ferte Chevresis Aerodrome in Marne Region
Jasta 65: Sissone Aerodrome in Marne Region
Jasta 7: Rumbeke Aerodrome in Flanders Region
Jasta 73: Alsace Region
Jasta 74: Alsace Region
Jasta 75: Alsace Region
Jasta 76: Alsace Region
Jasta 77: Alsace Region
Jasta 78: Alsace Region
Jasta 79: Verdun Region
Jasta 8: Villers le Sec Aerodrome in Marne Region
Jasta 80: Verdun Region

May 1, 1918

Jasta 10: Flanders Region
Jasta 11: Flanders Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Flanders Region
Jasta 15: Flanders Region
Jasta 16: St. Marguerte Aerodrome in Flanders Region
Jasta 18: Flanders Region
Jasta 19: Roupy Aerodrome in Marne Region
Jasta 2: Halluin Aerodrome in Flanders Region
Jasta 22: Juniville Aerodrome in Marne Region

Jasta 23: Flanders Region
Jasta 26: Halluin Aerodrome in Flanders Region
Jasta 27: Halluin Aerodrome in Flanders Region
Jasta 29: Flanders Region
Jasta 30: Flanders Region
Jasta 32: Flanders Region
Jasta 34: Flanders Region
Jasta 35: Flanders Region
Jasta 37: Juniville Aerodrome in Marne Region
Jasta 4: Flanders Region
Jasta 40: Thielt Aerodrome in Flanders Region
Jasta 43: Flanders Region
Jasta 46: Flanders Region
Jasta 49: Jabbecke Aerodrome in Flanders Region
Jasta 5: Flanders Region
Jasta 50: Sissone Aerodrome in Marne Region
Jasta 56: Ingelmunster Aerodrome in Flanders Region
Jasta 57: Halluin Aerodrome in Flanders Region
Jasta 58: Roulers Aerodrome in Flanders Region
Jasta 6: Flanders Region
Jasta 60: Verdun Region
Jasta 61: Vivaise Aerodrome in Marne Region
Jasta 65: Sissone Aerodrome in Marne Region
Jasta 7: Rumbeke Aerodrome in Flanders Region
Jasta 73: Alsace Region
Jasta 74: Alsace Region
Jasta 75: Alsace Region
Jasta 76: Flanders Region
Jasta 77: Flanders Region
Jasta 78: Alsace Region
Jasta 79: Verdun Region
Jasta 8: La Fere Aerodrome in Marne Region
Jasta 80: Verdun Region

July 1, 1918

Jasta 10: Pussieux Ferme Aerodrome in Marne Region
Jasta 11: Pussieux Ferme Aerodrome in Marne Region
Jasta 12: Flanders Region
Jasta 13: Alsace Region
Jasta 14: Flanders Region
Jasta 15: Vivaise Aerodrome in Marne Region
Jasta 16: St. Marguerte Aerodrome in Flanders Region
Jasta 18: Verdun Region
Jasta 19: Roupy Aerodrome in Marne Region
Jasta 2: Sissone Aerodrome in Marne Region
Jasta 22: Gomont Aerodrome in Marne Region
Jasta 23: Ghistelles Aerodrome in Flanders Region
Jasta 26: Vivaise Aerodrome in Marne Region
Jasta 27: Vivaise Aerodrome in Marne Region
Jasta 29: Flanders Region
Jasta 30: Flanders Region
Jasta 32: Flanders Region
Jasta 34: Flanders Region
Jasta 35: Flanders Region
Jasta 37: Juniville Aerodrome in Marne Region
Jasta 4: Pussieux Ferme Aerodrome in Marne Region
Jasta 40: Thielt Aerodrome in Flanders Region
Jasta 43: Flanders Region
Jasta 46: Flanders Region
Jasta 49: Vivaise Aerodrome in Marne Region
Jasta 5: Flanders Region
Jasta 50: Sissone Aerodrome in Marne Region
Jasta 56: Rumbeke Aerodrome in Flanders Region
Jasta 57: Flanders Region
Jasta 58: Flanders Region
Jasta 6: Pussieux Ferme Aerodrome in Marne Region

Jasta 60: Verdun Region
Jasta 61: Chambry Aerodrome in Marne Region
Jasta 65: Sissone Aerodrome in Marne Region
Jasta 7: St. Marguerte Aerodrome in Flanders Region
Jasta 73: Alsace Region
Jasta 74: Alsace Region
Jasta 75: Alsace Region
Jasta 76: Flanders Region
Jasta 77: Flanders Region
Jasta 78: Alsace Region
Jasta 79: Verdun Region
Jasta 8: Flanders Region
Jasta 80: Verdun Region

September 1, 1918

Jasta 10: Flanders Region
Jasta 11: Flanders Region
Jasta 12: Foreste Aerodrome in Marne Region
Jasta 13: Alsace Region
Jasta 14: Flanders Region
Jasta 15: Verdun Region
Jasta 16: St. Marguerte Aerodrome in Flanders Region
Jasta 18: Verdun Region
Jasta 19: Verdun Region
Jasta 2: Flanders Region
Jasta 22: Gomont Aerodrome in Marne Region
Jasta 23: Ghistelles Aerodrome in Flanders Region
Jasta 26: Vivaise Aerodrome in Marne Region
Jasta 27: Vivaise Aerodrome in Marne Region
Jasta 29: Flanders Region
Jasta 30: Flanders Region
Jasta 32: Alsace Region

Jasta 34: Flanders Region
Jasta 35: Flanders Region
Jasta 37: Juniville Aerodrome in Marne Region
Jasta 4: Flanders Region
Jasta 40: Thielt Aerodrome in Flanders Region
Jasta 43: Flanders Region
Jasta 46: Flanders Region
Jasta 49: Sissone Aerodrome in Marne Region
Jasta 5: Flanders Region
Jasta 50: Pomacle Aerodrome in Marne Region
Jasta 56: Rumbeke Aerodrome in Flanders Region
Jasta 57: Flanders Region
Jasta 58: Flanders Region
Jasta 6: Flanders Region
Jasta 60: Verdun Region
Jasta 61: Chambry Aerodrome in Marne Region
Jasta 65: Alsace Region
Jasta 7: St. Marguerte Aerodrome in Flanders Region
Jasta 73: Alsace Region
Jasta 74: Alsace Region
Jasta 75: Alsace Region
Jasta 76: Alsace Region
Jasta 77: Verdun Region
Jasta 78: Alsace Region
Jasta 79: Verdun Region
Jasta 8: Flanders Region
Jasta 80: Verdun Region

November 1, 1918

Jasta 10: Verdun Region
Jasta 11: Verdun Region
Jasta 12: Foreste Aerodrome in Marne Region

Jasta 13: Alsace Region
Jasta 14: Hooey Hoek Aerodrome in Flanders Region
Jasta 15: Verdun Region
Jasta 16: St. Marguerte Aerodrome in Flanders Region
Jasta 18: Verdun Region
Jasta 19: Verdun Region
Jasta 2: Flanders Region
Jasta 22: Gomont Aerodrome in Marne Region
Jasta 23: Ghistelles Aerodrome in Flanders Region
Jasta 26: Flanders Region
Jasta 27: Verdun Region
Jasta 29: Aertrycke Aerodrome in Flanders Region
Jasta 30: Flanders Region
Jasta 32: Flanders Region
Jasta 34: Flanders Region
Jasta 35: Flanders Region
Jasta 37: Juniville Aerodrome in Marne Region
Jasta 4: Verdun Region
Jasta 40: Thielt Aerodrome in Flanders Region
Jasta 43: Harlebecke Aerodrome in Flanders Region
Jasta 46: Flanders Region
Jasta 49: Alsace Region
Jasta 5: Flanders Region
Jasta 50: Chery les Pouilly Aerodrome in Marne Region
Jasta 56: Rumbeke Aerodrome in Flanders Region
Jasta 57: Flanders Region
Jasta 58: Flanders Region
Jasta 6: Verdun Region
Jasta 60: Verdun Region
Jasta 61: Chambry Aerodrome in Marne Region
Jasta 65: Verdun Region
Jasta 7: St. Marguerte Aerodrome in Flanders Region
Jasta 73: Alsace Region

Jasta 74: Alsace Region
Jasta 75: Alsace Region
Jasta 76: Alsace Region
Jasta 77: Verdun Region
Jasta 78: Alsace Region
Jasta 79: Verdun Region
Jasta 8: Verdun Region
Jasta 80: Verdun Region

French Squadrons

April 1, 1916

Esc 57: Verdun Region
Esc 65: Verdun RegionEsc Lafayette: Verdun Region
Esc 15: Verdun Region
Esc 3: Verdun Region
Esc 38: Auve Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 103: Flanders Region
Esc 79: Verdun Region
Esc 68: Verdun Region
Esc 73: Verdun Region
Esc 26: Verdun Region

June 1, 1916

Esc 57: Verdun Region
Esc 65: Verdun Region
Esc Lafayette: Verdun Region
Esc 15: Flanders Region
Esc 3: Flanders Region

Esc 38: Auve Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 103: Flanders Region
Esc 79: Verdun Region
Esc 68: Verdun Region
Esc 73: Flanders Region
Esc 26: Flanders Region

August 1, 1916

Esc 57: Verdun Region
Esc 65: Flanders Region
Esc Lafayette: Verdun Region
Esc 15: Flanders Region
Esc 3: Flanders Region
Esc 38: Auve Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 73: Flanders Region
Esc 103: Flanders Region
Esc 79: Verdun Region
Esc 68: Verdun Region
Esc 26: Flanders Region

October 1, 1916

Esc 57: Verdun Region
Esc 65: Flanders Region
Esc Lafayette: Alsace Region
Esc 15: Flanders Region
Esc 3: Flanders Region
Esc 38: Auve Aerodrome in Marne Region

Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 73: Flanders Region
Esc 77: Verdun Region
Esc 103: Flanders Region
Esc 79: Verdun Region
Esc 68: Verdun Region
Esc 26: Flanders RegionDecember 1, 1916
Esc 103: Flanders Region
Esc 57: Verdun Region
Esc 65: Ravenel Aerodrome in Marne Region
Esc Lafayette: Flanders Region
Esc 15: Flanders Region
Esc 3: Flanders Region
Esc 38: Auve Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 73: Flanders Region
Esc 77: Verdun Region
Esc 79: Verdun Region
Esc 68: Alsace Region
Esc 26: Flanders Region

January 1, 1917

Esc 103: Flanders Region
Esc 57: Verdun Region
Esc 65: Ravenel Aerodrome in Marne Region
Esc Lafayette: Flanders Region
Esc 15: Flanders Region
Esc 3: Flanders Region
Esc 38: Auve Aerodrome in Marne Region
Esc 49: Alsace Region

Esc 67: Verdun Region
Esc 73: Flanders Region
Esc 77: Verdun Region
Esc 81: Sacy le Grand Aerodrome in Marne Region
Esc 79: Verdun Region
Esc 68: Alsace Region
Esc 26: Flanders Region

March 1, 1917

Esc 103: Verdun Region
Esc 57: Verdun Region
Esc 65: St. Just Aerodrome in Marne Region
Esc 79: Verdun Region
Esc 84: Ravenel Aerodrome in Marne Region
Esc Lafayette: Flanders Region
Esc 15: Flanders Region
Esc 3: Verdun Region
Esc 38: Auve Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 73: Verdun Region
Esc 77: Verdun Region
Esc 81: Sacy le Grand Aerodrome in Marne Region
Esc 68: Alsace Region
Esc 26: Verdun Region

May 1, 1917

Esc 103: Bonne Maison Aerodrome in Marne Region
Esc 57: Lhery Aerodrome in Marne Region
Esc 65: Chaudon Aerodrome in Marne Region
Esc 79: Verdun Region

Esc 84: Bonneuil Aerodrome in Marne Region
Esc Lafayette: Flanders Region
Esc 15: Flanders Region
Esc 3: Bonne Maison Aerodrome in Marne Region
Esc 38: La Noblette Ferme Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 73: Bonne Maison Aerodrome in Marne Region
Esc 77: Verdun Region
Esc 81: La Noblette Ferme Aerodrome in Marne Region
Esc 95: Verdun Region
Esc 68: Alsace Region
Esc 26: Bonne Maison Aerodrome in Marne Region

July 1, 1917

Esc 103: Bonne Maison Aerodrome in Marne Region
Esc 57: Lhery Aerodrome in Marne Region
Esc 65: Foquerolles Aerodrome in Marne Region
Esc 79: Verdun Region
Esc 84: Bonneuil Aerodrome in Marne Region
Esc 95: Verdun Region
Esc Lafayette: Fismes Aerodrome in Marne Region
Esc 15: Merville Aerodrome in Flanders Region
Esc 3: Bonne Maison Aerodrome in Marne Region
Esc 38: La Noblette Ferme Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 73: Bonne Maison Aerodrome in Flanders Region
Esc 77: Verdun Region
Esc 81: La Noblette Ferme Aerodrome in Marne Region
Esc 96: Verdun Region
Esc 26: Bonne Maison Aerodrome in Marne Region

September 1, 1917

Esc 103: St. Pol sur Mere Aerodrome in Flanders Region
Esc 57: Bergues Aerodrome in Flanders Region
Esc 65: Verdun Region
Esc 79: Verdun Region
Esc 84: Bonneuil Aerodrome in Marne Region
Esc 95: Maison Nueve Aerodrome in Marne Region
Esc Lafayette: Verdun Region
Esc 15: Merville Aerodrome in Flanders Region
Esc 154: Bonneuil Aerodrome in Marne Region
Esc 3: St. Pol sur Mere Aerodrome in Flanders Region
Esc 38: La Noblette Ferme Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Bonneuil Aerodrome in Marne Region
Esc 73: St. Pol sur Mere Aerodrome in Flanders Region
Esc 77: Verdun Region
Esc 81: Verdun Region
Esc 96: Verdun Region
Esc 68: Alsace Region
Esc 26: St. Pol sur Mere Aerodrome in Flanders Region

November 1, 1918

Esc 100: Hauvine Aerodrome in Marne Region
Esc 103: Hauvine Aerodrome in Marne Region
Esc 57: Francheville Aerodrome in Marne Region
Esc 65: Marson Aerodrome in Marne Region
Esc 79: Verdun Region
Esc 84: Marson Aerodrome in Marne Region
Esc 95: Trecon Aerodrome in Marne Region
Esc Lafayette: Verdun Region
Esc 15: Flanders Region

Esc 154: Tille Aerodrome in Marne Region
Esc 158: Cappelle Aerodrome in Flanders Region
Esc 159: Verdun Region
Esc 163: Villers St. George Aerodrome in Marne Region
Esc 164: Saints Aerodrome in Marne Region
Esc 167: La Noblette Ferme Aerodrome in Marne Region
Esc 3: Hauvine Aerodrome in Marne Region
Esc 38: Fere en Tardenois Aerodrome in Marne Region
Esc 49: Alsace Region
Esc 67: Verdun Region
Esc 68: Alsace Region
Esc 73: Hauvine Aerodrome in Marne Region
Esc 77: Plessis-Belleville Aerodrome in Marne Region
Esc 81: Cernon Aerodrome in Marne Region
Esc 96: Plessis-Belleville Aerodrome in Marne Region
Esc 26: Flanders Region

U.S. Squadrons

April 1, 1918

103rd Aero: La Noblette Ferme Aerodrome in Marne Region
147th Aero: La Gorgue Aerodrome in Flanders Region
94th Aero: Verdun Region
95th Aero: Verdun Region

June 1, 1918

103rd Aero: Bray Dunes Aerodrome in Flanders Region
147th Aero: Verdun Region
148th Aero: Cappelle Aerodrome in Flanders Region
94th Aero: Verdun Region
95th Aero: Verdun Region

August 1, 1918

103rd Aero: Verdun Region
147th Aero: Saints Aerodrome in Marne Region
148th Aero: Cappelle Aerodrome in Flanders Region
17th Aero: Petite Synthe Aerodrome in Flanders Region
27th Aero: Saints Aerodrome in Marne Region
28th Aero: Verdun Region
94th Aero: Verdun Region
95th Aero: Verdun Region

October 1, 1918

103rd Aero: Verdun Region
138th Aero: Verdun Region
147th Aero: Verdun Region
148th Aero: Flanders Region
17th Aero: Flanders Region
22nd Aero: Verdun Region
25th Aero: Verdun Region
27th Aero: Verdun Region
28th Aero: Verdun Region
94th Aero: Verdun Region
95th Aero: Verdun Region

Glossary of Terms Commonly Used in Aviation

aerobatics: aerial maneuver stunts

ailerons: hinged flaps operated by the control lever to bank the machine and maintain its lateral level

ailerons, balanced: by connecting the ailerons of each wing, so that when one is pulled down and the other is pulled up, the surfaces are made to balance

air speed: the speed of the airplane through the air

air speed indicator: an instrument for registering the speed of the airplane through the air

altimeter: an instrument for indicating the distance of the airplane from the ground

aspect ratio: the proportion of span to chord of a plane

back: a change of wind in a counterclockwise direction (for example, from E to N)

backwash: the disturbed air in the wake of an airplane in flight

ballooning: the upward glide of the airplane near the ground caused by the pilot descending too fast and pulling the control lever back too much or too quickly

bank: to raise one wing for the purpose of turning

bay: the space enclosed by two struts and their upper and lower adjoining surfaces

belt: the safety strap that secures the pilot to his seat

bessoneau: a tent for storing airplanes that can be quickly erected and dismantled

biplane: an airplane with two pairs of wings set one above the other

blip: to switch the engine on and off rapidly

body: the part of the airplane that accommodates engine, pilot, passenger, and fuel tanks

boss (of a propeller): the central portion by which a propeller attaches to the engine

bounce: the upward and forward movement of an airplane that has struck the ground without flattening out sufficiently; to surprise an enemy

bumps: wind turbulence

cabane: the projecting arrangement of struts above the pilot's head on a monoplane to which antilift wires attach

cabre: tail down

camber: the maximum depth of curvature of a wing's upper and lower surfaces

cell: the whole of a plane's lower surface and the whole of its top surface, with struts and wires holding them together

cellule: the boxlike rectangular compartments in a biplane formed by the upper and lower interplane struts

center of gravity: center of weight

center of posture: a line running from wingtip to wingtip, through which all the air forces on the wing may be said to act

center section: the center cellule of a biplane where the cellule is made detachable from the wings

chocks: wooden blocks placed in front of the wheels of an airplane on the ground to prevent it from moving when the engine is started

chord of a wing: the distance between the leading and trailing edge of a wing

cockpit: the pilot's seat

compression: the upward stroke of the piston and the cylinder where the explosion of fuel takes place

conk: the engine is said to "conk" when it fails

contact: denotes that the ignition switch is on

control lever: Generally known as the "joystick" or "stick." A vertical lever controlling the fore-and-aft and lateral movements of the airplane.

control wires: wires connecting the rudder bar and control lever with their respective controlling surfaces

cowl: a sheet-metal cover generally fitted over the engine

crash helmet: a specially made flying helmet designed to save the pilot's life in case of a crash

dihedral angle: an airplane is said to possess dihedral angle when the wings rise upward from the center of the machine

dive: to descend steeply

drift: the sideways motion of the airplane due to a side wind

elevator: A hinged controlling surface or flap, operated by the fore-and-aft movement of the control lever. Always set parallel with the wings of the airplane and generally behind them. Used to control the up and down motion of the plane and in steep banks, to make the plane turn.

empenage: the tail section of the airplane, consisting of rudder and elevator

engine bearer: the metal framework or tubing to which the engine is fixed

exhaust: the upward stroke of the piston which drives the burnt and exhaust gas out of the combustion chamber

extensions: additional lifting surfaces added to the top of planes

factor of safety: obtained by dividing the stress at which a body will collapse by the maximum stress it will be called upon to bear

fin: a fixed vertical plane generally fitted in front of the rudder to increase the airplane's stability

flattening out: a phrase used to describe the gradual decrease of an airplane's gliding angle until it merges into the horizontal a few inches off the ground

formation flying: the practice of a group of airplanes flying in a predetermined pattern

fuselage: the main body of the airplane

gap: the distance between the upper and lower wings of the airplane

gas bag: slang term for airships

glide: to descend with the engine cut off with the machine under control

gliding angle: the angle machine's the fore-and-aft line makes with the horizon to make a correct gliding descent

ground speed: the speed of the machine relative to the ground, which may be equal to, greater, or less than the airspeed; therefore, ground speed is equal to airspeed plus or minus wind speed

hangar: an airplane shed

heavy-handed: refers to a pilot who is clumsy at the controls

height indicator: See *altimeter*

hoik: to make the airplane climb steeply and suddenly

horizon: the limit of ground in view

hun: slang term for a person learning to fly

induction: the inlet stroke of the engine

kathedral: an airplane is said to posses a kathedral angle when the wings slope downward from the center of the fuselage

keel surface: the side surface of an airplane as opposed to the head-on surface

knock: a peculiar noise emanating from the engine and usually indicating trouble

knot: a nautical mile per hour

leading edge: the point or entering position of a wing

leeward: away from the wind

leeway: lateral drift to leeward

lift: the force exerted by the air on the plane perpendicular, or nearly so, to its motion

log book: a book where pilots record the details of each flight

lubber line: a mark on the body of a compass corresponding with the airplane's fore-and-aft line

nacelle: the body of a pusher airplane

nose: the front part of an airplane

nose dive: a very steep descent

nose heavy: backward pressure required on the control lever to make the airplane fly level

nose piece: the front-central portion of a rotary engine

outrigger: the framework connecting an elevator placed in front of the machine with the main planes

pancake: to drop to earth from a height of a few feet owing to losing flying speed and flattening out too soon

pegging down: securing an airplane by rope to pegs in the ground to prevent it from tipping over in heavy wind

pitch (of a propeller): the forward distance the propeller would travel if it were allowed to cut its own way, without slip, through some medium (such as butter)

plane: Term applied to the supporting surfaces of an airplane. The planes may be cambered, as is the tail.

plane, main: the wings on an airplane

pocket air: a disturbance in the air that causes the airplane to drop altitude

propeller: the airscrew driven by the engine that forces the airplane through the air; generally known as the "prop"

protractor: an instrument for measuring angles

pusher: an airplane in which the propeller is fitted behind the main wings

quirk: a person learning to fly

race: the practice of speeding up an engine's revolutions to their maximum

radius of action: the distance an airplane can fly from its starting point and return without replenishing the tanks

remou: a disturbance in the air

revs: short for revolutions

rotary: a type of engine in which the cylinders are set radially around the crankshaft

RPM: revolutions per minute, generally applied to the engine

rudder: a vertical controlling surface, or surfaces, set parallel with the fore-and-aft line of the machine, and used to control the direction of flight

rudder, balanced: a vertical controlling surface set parallel with the fore-and-aft line of the airplane, but pivoted some way back from its leading edge

rudder bar: a pivoted lever, foot-operated, controlling the rudder

rudder post: the upright member to which the rudder is hinged

scout: a small, single-seat plane

sideslip: a sideways movement of an airplane through the air

squadron: an organization consisting of several aircraft

stability: the property of an airplane whereby it tends to return to its normal flying position if left uncontrolled

stagger: the amount that the leading edge of one wing is set in advance or behind the leading edge of the other plane, measured with the airplane in the flying level position

stall: to lose flying speed

streamline: a shape of a body that offers the least resistance to its path through the air

struts: vertical members uniting spars in upper and lower planes

tachometer: engine revolution counter

tail heavy: forward pressure required on the control lever to make the airplane fly level

throttle lever: controls the amount of fuel entering the engine

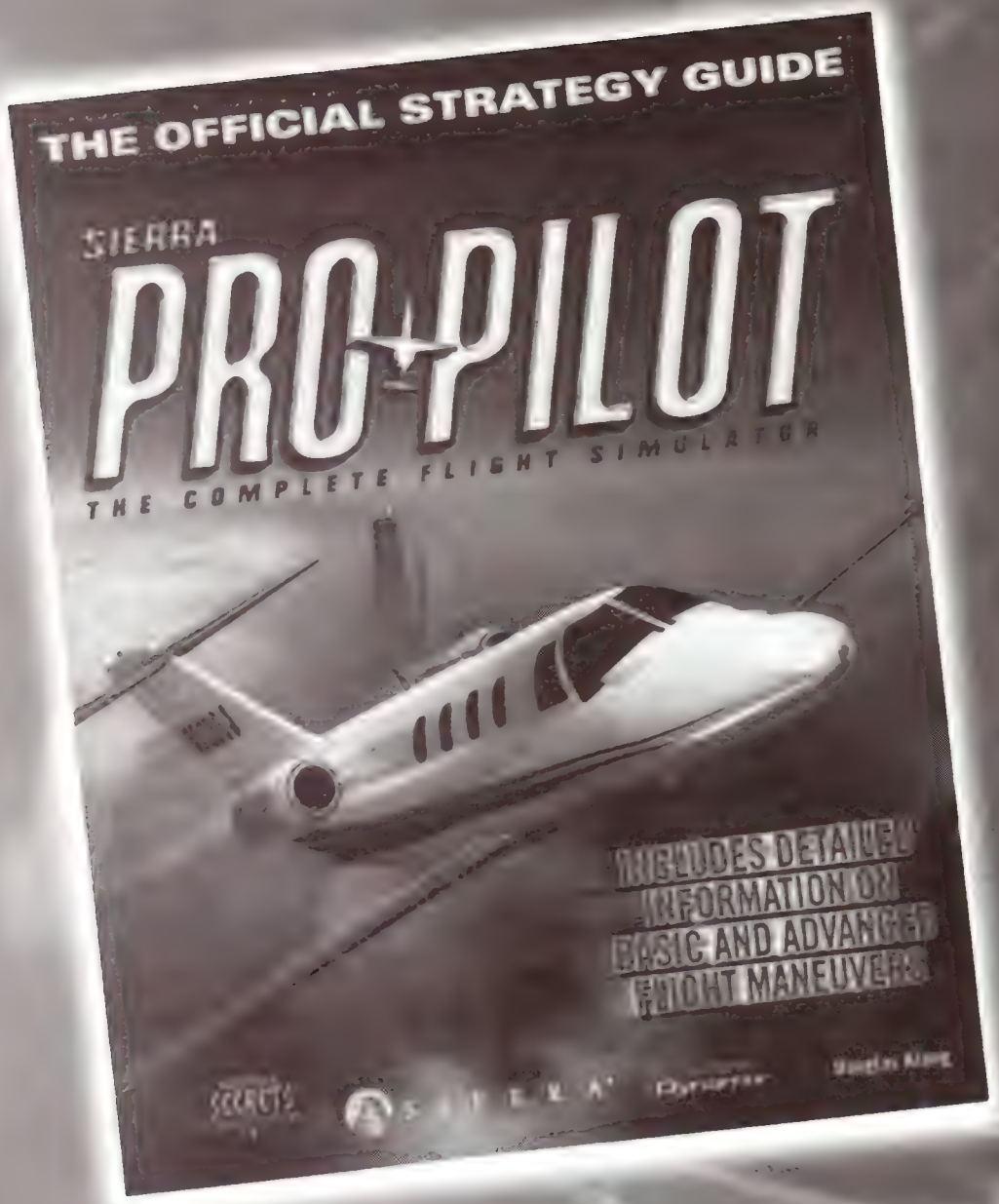
torque, engine: the reaction of a propeller that tends to cause the airplane to turn about its longitudinal axis in a direction opposite that toward which the propeller is revolving

trailing edge: the rear edge of the wing

triplane: an airplane with three pairs of wings, set one above the other

undercarriage: that part of the airplane that carries the weight while on the ground

zoom: to ascend very steeply after flying level at full speed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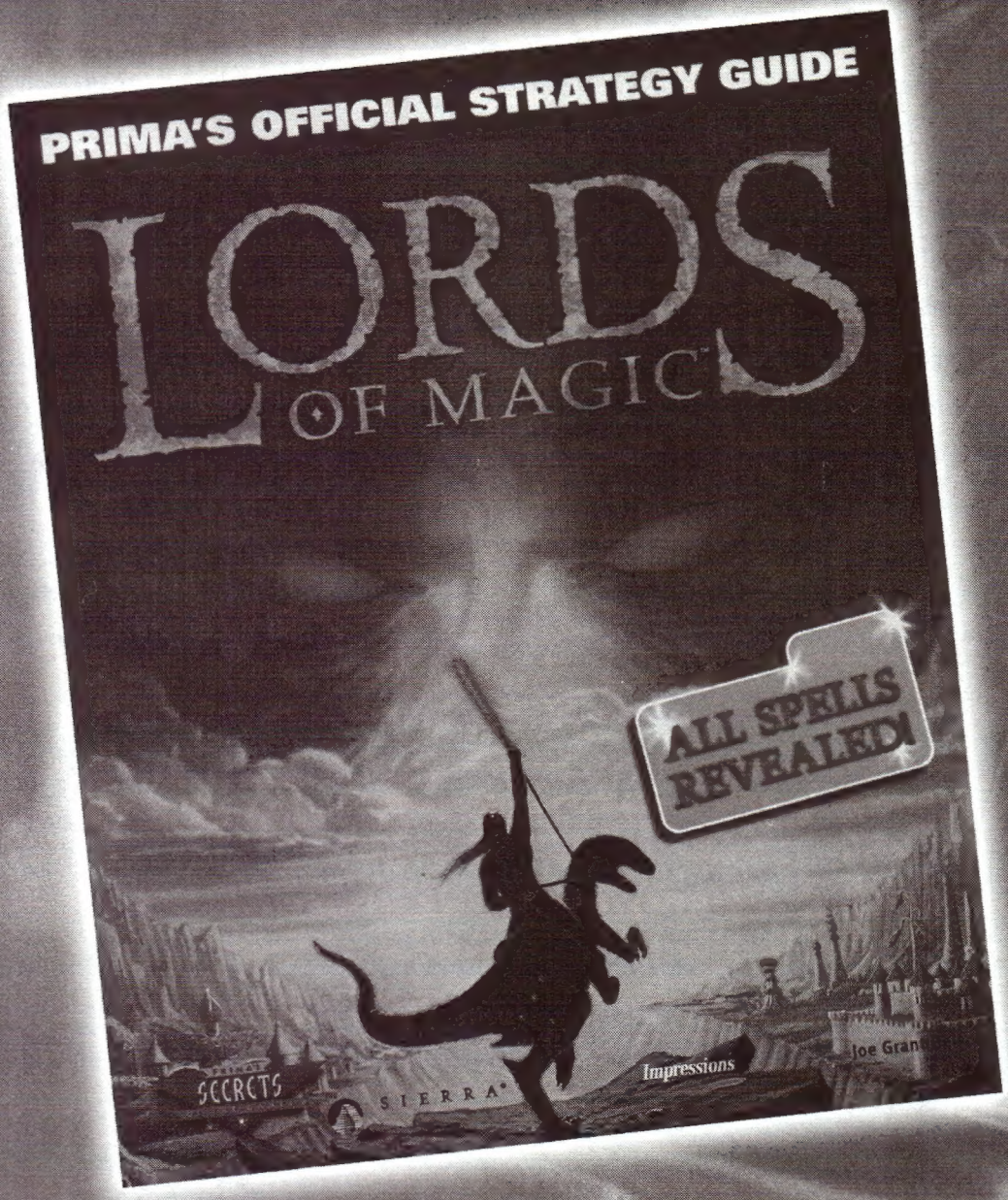

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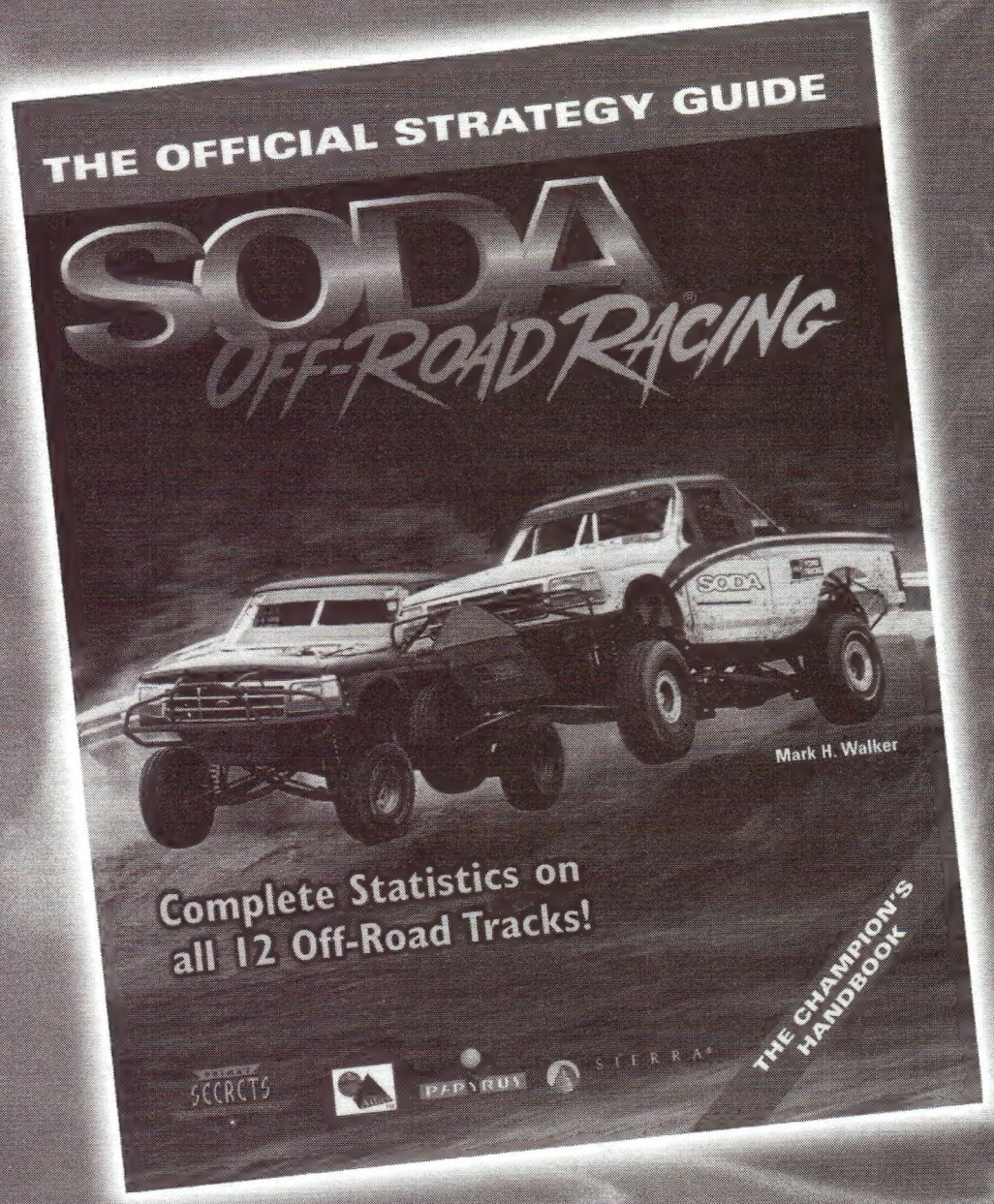

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